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FOOD MANUFACTURE

Incorporating Canning, Packing and Preserving.

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NOVEMBER . . 1934

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

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FOOD MANUFACTURE

Vol. IX, No. 11 November, 1934

Leicester

THIS IS the season for exhibitions. One might almost imagine they were sent to brighten the dismal passing of summer into winter. We have had our fill of confectionery, bread, groceries, drugs, " brighter homes ", beer, hairdressing, perfumes, face creams, radios, motor cars, and innumerable other things which are the pride of ingenious brains, and now we have fruits in and out of cans.

As each of these annual canning events comes round, we always find ourselves a little confused as to the significance of the title. One notices the present designation—" The Imperial Fruit Show and Canners' Exhibition "—but two years ago at Birmingham, and before, we used to think of it as the Canners' Convention, with the Imperial Fruit Show well in the background. In our view the Canners' Convention was a title which invested the affair with a certain dignity and sense of importance, and to substitute the more commonplace " Exhibition " appears to be a regrettable act of debasement.

However, this may amount to nothing more than sacrificing accuracy to sentiment, and after all the Imperial Fruit Show is in its fourteenth year, whereas the canning part was grafted on to it only eight years ago.

Palaver Days

But, really, there is a more fundamental point involved. It looks as though the palaver days of canning are over. By this we mean that at previous meetings gentlemen of knowledge and authority in the industry delivered themselves of very interesting and instructive papers on problems that loomed up in the mind of the canner like bunkers on an alpine golf course. And some very lively, stimulating discussions took place. Among the canners there is probably more latent wit than is to be found in any other community, and these Conventions gave them ample scope for brilliant swordplay, interspersed with valuable chunks of knowledge and amusing anecdotes. People are now beginning to experience disappointment at the loss of these " treats ". Instead of perpetually trudging round and round the stands until driven to the bar by utter weariness and sore feet, why can't they be permitted to profit both physically and intellectually by sitting at the feet of authority, absorbing its golden fragments of scientific and technical wisdom ?

The Way Out

In a word, what we suggest is that it would be a good thing to provide at these annual exhibitions —as they now are—a fair sprinkling of technical lectures and debates, not long-winded affairs lasting the whole morning or afternoon, but several meetings each of, say, two hours' duration. That there is no lack of problems and difficulties is clear to anyone who will read the first article of the present issue outlining the work in progress at the Campden research station. It is, in fact, safe to say that the canning industry is to-day conscious of more unsolved difficulties than it was five years ago. Research no sooner solves one set of problems than it uncovers a host of others, and as the industry marches ahead, consolidating its achievements and planning for the future, attracting more and more technical brains and men of organising ability, the outlook ranges over an ever-widening field in which obstacles shape themselves for consideration in the immediate future.

One might go further and put forward the suggestion that foreign professors and doctors of canning and suchlike subjects be called in to play a part. It is not difficult to get " big bugs " from the Continent at quite a moderate cost, and there is always the possibility of roping in American experts who make a habit of a European trip

every once in a while. There was a rumour recently that Dr. Kohman of the National Canners' Association was over here, and some few months ago we heard that Professor Cruess was "doing" Europe. It is such men as these who would willingly respond to an invitation and whose talks would command the greatest respect and interest.

"If You Can't Buy——"

By such means is it readily possible to augment very considerably the usefulness and interest of industrial exhibitions in general. In the course of much experience in these affairs, both at home and abroad, we have been gradually forced to the conclusion that exhibitions in their present form are mere relics of the past, that they are glorified country fairs and bazaars of the "way back home" brand, and that there is far too much of the "It's your money we want. If you can't buy—don't come" spirit about them. Our attitude is that they should be informative and educational and not purely displays of "goods for sale". To this end they should include lectures, discussions, demonstrations, moving pictures, and any other means of bringing about the spreading of information and the exchange of ideas. They are old fashioned, and they have not kept pace with modern requirements; too often those in charge of stands display a surprising ignorance of their own products.

Fortunately, it is a simple matter to apply the remedy, and we feel certain that we do not stand alone in our desire to see a speedy readjustment to the, as yet, ill-defined, nebulously expressed requirements of to-day and to what will undoubtedly be very clearly and definitely expressed in the none too distant future.

Bottlers Set the Pace

Beverages, and carbonated beverages in particular, are only an arm—if as much as that—of the giant food industry, yet at the time this Imperial Fruit Show and Canners' Exhibition is running its course at the Granby Halls in Leicester, the American bottlers of carbonated beverages are holding their *Annual Convention and Exposition*. Please note the title! If you are a psychologist (and who is not, these days?) you will be able to gauge how much more power, dignity, and importance are embodied in these four words as compared with the thin, pale, and anæmic-looking *Canners' Exhibition*.

Before us lies a notice from the *Bureau of Public Relations* (again note the title) which informs us that "A symposium on water treatment and mineral water bottling, a short course in the practical use of scientific methods for beverage manufacture which will have exceptional educational value for plant foremen, and an authoritative discussion of methods for training route salesmen, constitute the programme for five Special Meetings at the Annual Convention and Exposition of the American Bottlers of Carbonated Beverages, in Buffalo, N.Y."

"An Open Forum"

Some of the subjects are: Water Treatment and Mineral Water Bottling, Removing Odours and Alkalinity from Water, Syphon Bottling, Carbonated Sparkling Waters, Practical Bacteriology and Sanitation, Bottle Washing and Sterilisation Methods (Dr. Levine), and Maintaining Beverage Quality and Uniformity (Dr. Toulouse).

Then the notice proceeds thus: "After each speaker has concluded his formal talk, each meeting will become an Open Forum in which pertinent questions and suggestions from the floor will be requested. All bottlers are urged to attend all these five 'Special Meetings' and to bring their plant foremen with them."

An American Prodigy

If the American bottlers can do this sort of admirable thing, why can't the British canners do likewise? There is nothing to be sacrificed and everything to be gained. The bottlers get their affair over in four days, which is quite long enough for most people; in fact, in our opinion three days would be better. That exhibitions should drag themselves through a whole weary week borders on the Inquisition, and the amount of money spent on corn cures, shoe leather, and rest homes probably devours most of the profits. Truly, as a German professor of military tactics says, "The English are a remarkably tenacious race"!

Non-Stop Variety

One last word on this subject. Canners might do well to take a leaf out of the book of the Non-Stop Variety form of entertainment, which we believe is so much in vogue. The idea is that the scenic background should be provided by the exhibition part of the affair, the performing artists should be our professors, doctors, and practical canning authorities, while we (*i.e.*, those who come to be instructed and entertained) form the appreciative audience.

At the risk of raising a *p*H 4 smile, and in spite of what we said about the "last word", we would propose a further step (entirely logical, nevertheless) for serious consideration. An up-to-date theatre has a revolving stage, and such a stage might be put to good purpose at our ideal Canners' Annual Convention and Exposition. Instead of courting disastrous mental and bodily breakdown by trudging untold distances round about the stands, would it not be more desirable from every point of view if we were to recline comfortably in our plush chairs and, with our full energy unimpaired, view the machinery and canned goods tastefully arranged upon the stage, which by reason of its revolutions would display these items as an unbroken, time-saving series of expositions? What an opportunity for technical demonstrations, artistic effects, spectacular displays, and high-pressure sales talk! And as for the Can-Cans, they could no doubt be prevailed upon to give a "turn" of incantations and mystic rites. Of course the static part of the exhibition could still go on—to die a natural death if it wished—but the panoramic exposition would be quite sufficient for those of us who have little time and energy to lose and who want to see a thing once only.

Dyed Peas

In the recently published Annual Report of the Chief Medical Officer of the Ministry of Health, on the state of the public health for 1933, some attention is devoted to the practice of colouring canned peas. The dyeing of peas with copper salts was prohibited by the Public Health Regulations, 1925, and as a result canners sought for other means by which a deep green colour might be given to peas, which when canned without any colouring matter take on a pale and unattractive shade. A mixture of two aniline dyes, a yellow and a blue, was introduced and has been used extensively. The results are not always ideal, as some peas take one colour more than another and anything from a yellowish green to a greenish blue may be obtained.

Tell the Public

Sir George Newman goes on to state that the dyeing of canned peas in this country is now universally practised, so that it is difficult, if not impracticable, for a consumer to obtain undyed English canned peas. The Chief Medical Officer thinks that most consumers of English canned peas are unaware that these are artificially dyed, and that if this knowledge was more general it is likely that a demand for undyed peas, such as those consumed in the United States, would be created. It can be reasonably maintained that the consumer in this country is entitled to know whether or not the canned peas that he purchases are dyed, and Sir George suggests that this information should be conveyed by means of a declaration on the label.

This might, of course, create a demand for undyed peas, but we do not think it would last long, because the average individual likes his peas green and would not eat pale anæmic-looking ones. This is the reason why so many cooks unnecessarily add bicarbonate of soda to green peas. So long as the peas look attractive the average consumer doesn't worry if a little of the vitamin has been destroyed.

Processed Peas

Most consumers believe that canned peas are prepared simply by canning fresh green peas, but this is by no means always the case. A considerable trade exists in what are known commercially as "processed" peas. These are prepared, not from fresh peas, but from dried peas which are soaked for several hours to soften them and are then dyed green and canned in the same way as fresh peas, which they thus come to simulate. The report states that there is little doubt that many persons who buy these "processed" dried peas think they are getting canned fresh peas, and suggests that an adequate declaration of their nature seems called for in the interests of the consumer.

Composition of Fowl

R. Holcomb (*Can. Chem. Met.*, 1934, p. 182) finds that the composition of the domestic fowl varies considerably, as judged from the examination of some 34 birds selected for their uniformity in age and previous feeding. The moisture varied from 54 to 75 per cent., the fat 6 to 28 per cent., the protein 15 to 22 per cent. The average composition of the series of fowls was: Moisture 65·33 per cent., fat 13·99 per cent., protein 19·79 per cent., and mineral ash 0·89 per cent.

The moisture content increased with decrease in fat. The relationship is not linear, but is represented by the formula, moisture $= -0{\cdot}791 \times \text{fat} + 76{\cdot}4$.

It is pointed out that the fat can be determined satisfactorily only by the acid digestion process—*i.e.*, digestion of the sample with hydrochloric acid until of a liquid consistency and then extracting the mass with ether. This avoids drying of the sample, which may alter the nature of the fat,

while up to 25 per cent. of the fat may be retained by the flesh if extracted dry in the usual way in a Soxhlet apparatus.

Imported Canned Goods

Port medical officers have noted from time to time that canned foods, such as tomatoes or fruit, are received with definite evidence of having been resoldered. In some cases further examination has revealed the fact that the tins have blown and the contents found to be unsterile. Of course, there is no direct evidence that the additional soldering has not been carried out at the time of sterilisation, or to remedy soldering defects at the time of canning, and not later on as a means of remedying defects caused by faulty canning methods. The medical officers have enquired what procedure they should adopt in regard to cans which have been resoldered, and we understand that they have been advised that such cans should be condemned.

This Little Pig

The colour question in pigdom has created almost as much controversy as the colour bar in America. For some obscure reason black has always been associated with the sinister and unwelcome things of life; we talk about black looks and black Fridays, and we hate to get into anyone's black books. We have black sheep and black shirts. The preference of white to black has penetrated even to the piggery, and black pigs have been deemed inferior to white ones to the tune of 6d. a score. But this is to be changed. Owing to the beneficent action of the Pig Marketing Board this colour bar is to be removed, and after January 1 next a condition of complete equality before the law and valuer is to prevail between whites and blacks. After all, the colour is but skin deep, and when they have had their day and ceased to be pigs in order to become pork, there is no discernible difference in the quality of the meat. It is not a great matter, nor one of outstanding importance, but it does show that the Pig Marketing Board is doing something!

Eggs

The reports of the Reorganisation Committees for eggs and poultry have not yet been issued, and pending receipt of these the Government have given further consideration to the supply of eggs in shell, in view of a report from the Market Supply Committee. Foreign supplying countries have been asked to continue the "stand still" agreement which was put into operation last March, and also to effect a further reduction of 5 per cent. in shipments between October and December.

Spotting the Wrong 'Un

In accordance with the Agricultural Produce (Grading and Marking) Act, foreign eggs must be labelled plainly with the country of origin. Certain importers, however, in order to palm off foreign eggs as English new-laid, have been at some pains to remove the markings, thus rendering it very difficult to differentiate between the foreign egg and an English one. But once more science has come to the consumer's assistance, and by the use of the mercury vapour lamp the fraud is easily spotted. A case is recorded in the Portsmouth City Analyst's report, and he states that the use of the mercury vapour lamp was indispensable, for whereas it was almost impossible to differentiate the foreign eggs by other means, with the lamp the portion of the egg-shell which had received treatment to remove the foreign mark was clearly and definitely shown. The subsequent prosecution led to a conviction and fine.

Coffee Mixtures

The determination of the proportions of coffee and chicory in coffee mixtures is a matter of some importance, and the recent work of Hughes and Wise on the subject is of interest. The object of the work was the standardisation of the usual test for estimating the proportions of coffee and chicory by measuring the specific gravity of a decoction. The fineness of grinding should be such that the sample passes a 40-mesh sieve, the extraction is 5 per cent., and the time of decoction half an hour. The method is very ingenious and appears to give reliable results. Those readers interested in actual details should consult the original paper (*J. Soc. Chem. Ind.*, 1934, vol. 53, p. 189 T).

Babies—or Babied?

There are tricks in all trades, but we have just heard of a new one from America. "Baby" carrots can be made from large ones by merely cutting off the tips of the roots and giving them a few turns in a vegetable peeler to round off the ends.

Since the physiological age of the tips and of young carrots of the same size is approximately the same, there is no appreciable difference between them.

BRITISH CANNING RESEARCH

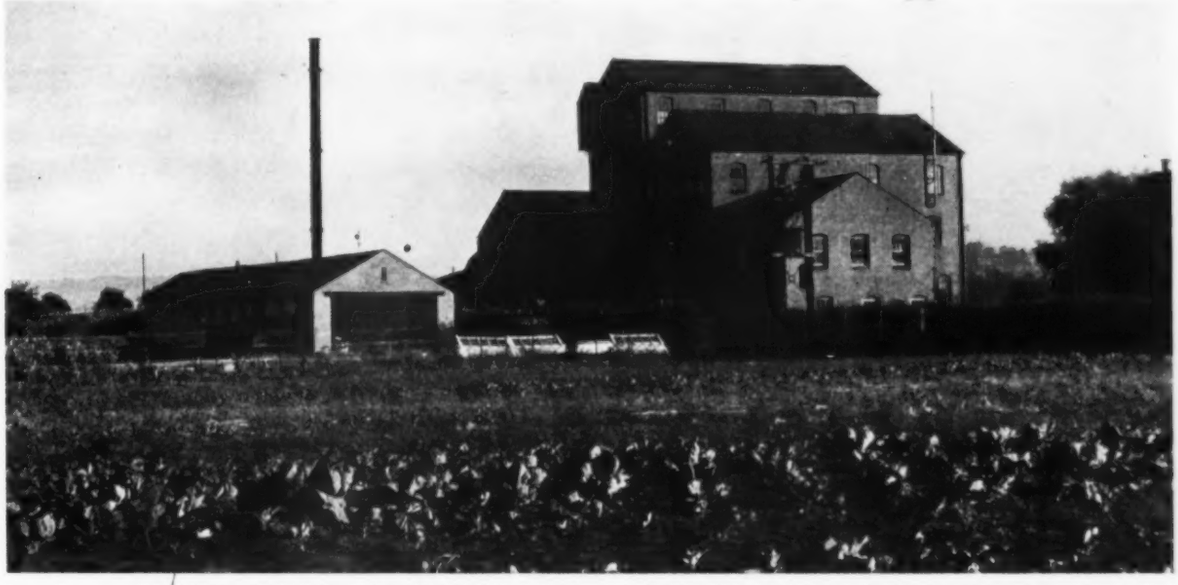
Mr. F. Hirst.

SINCE ITS inception seven years ago this journal has taken a keen interest in scientific investigation appertaining to all branches of the food industry, and as the present issue is largely devoted to canning it is fitting that some space should be given to the Research Station which has played such an important part in the development of this industry during the past few years.

The majority of our readers in this country and many in the Empire are aware that the Campden Research Station is situated near the charming old-world town of Campden in the heart of the rapidly expanding fruit-growing section of Gloucestershire, and not far from Evesham, the centre of one of the most important fruit and vegetable growing areas in this country.

The Station originated from an emergency scheme when the country was faced with the menace of food shortage during the war, and the premises were purchased by the Government in 1918, primarily for the manufacture of jam for the troops. Before production work could be commenced, however, the war had come to an end, and the food situation was much less acute. Eventually it was decided to use the building as a centre for investigational work on the preservation of fruit and vegetables, and for administrative purposes it was attached to the University of Bristol. The work of the Station was at first confined to preservation on a domestic scale, and research work on the wider commercial aspect was not commenced until 1923, when Mr. A. Appleyard, M.Sc., F.I.C., and Mr. F. Hirst, M.Sc., A.R.C.Sc., were appointed. These men concerned themselves with problems of an industrial rather than of a purely scientific nature, and as the aim of the Station was to create a wider market for horticultural produce it was decided to concentrate on canning. At that time there were only three or four firms engaged in the canning of fruit and vegetables in England, and very little information on the subject was available in this country. There was, however, a big demand for canned fruits, and the imports of these products were increasing year by year.

The possibility of establishing a canning industry in



The Research Station, Campden, with a portion of the Experimental Plots in the foreground.

this country on a much larger scale began to receive the attention of the Ministry of Agriculture and the tinplate manufacturers in South Wales, and eventually the National Food Canning Council was formed under the energetic chairmanship of Sir Edgar Jones. The Council dealt with the problems of organisation and publicity, while the advisory and research work was delegated to the staff at Campden. The work of the Station thus became clearly defined.

In 1927, Mr. W. B. Adam, M.A., A.I.C., was appointed as an additional chemist: later in the same year Mr. Appleyard left the Station to take up an important appointment in South Africa, and Mr. Hirst was made Resident Director.

Mr. W. B. Adam.

During the years 1927 to 1932, when the industry was developing rapidly, the whole of the scientific, advisory, and administrative work at Campden was carried out by Mr. Hirst and Mr. Adam, and during this time they built up an excellent reputation in the canning industry. That the industry appreciated their efforts was shown by the presentations made to them during the Canners' Convention at Manchester in 1931.

Many important practical problems were successfully investigated during the period referred to, and the following example relating to the canning of peas will indicate the importance of the work carried out. The use of copper sulphate for the purpose of imparting a green colour to canned peas was prohibited early in 1927, and consequently the peas canned that year were very difficult to dispose of owing to the dull, unattractive colour of the product. Before the following year an alternative method was discovered at Campden, and as the process was only divulged to British canners the latter soon obtained a firm footing in the market for canned peas.

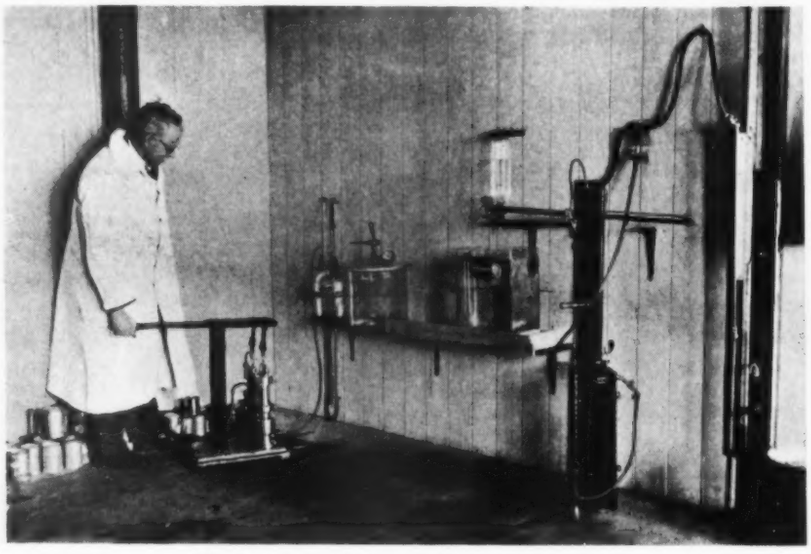
A little later on the present method of canning dried peas was worked out at the Research Station, and the packing of this product now constitutes one of the most important winter lines for the canners in this country.

In 1930, a contributory scheme was introduced under which Government aid was confined to a block grant sufficient to maintain the staff as it existed at that time, and any further sum required for the maintenance or extension of the work had to be obtained from trade subscriptions or other sources. This scheme has been very successful, and the canners and members of the allied trades have given substantial financial support, which has enabled three new appointments to be made during the past two years. New laboratories have been constructed where necessary, and at present the Station possesses well-equipped chemical, bio-chemical, physics, and bacteriological departments. In addition, there is a large practical canning room and another room containing a small experimental plant—comprising vacuum pan, separator, homogeniser, closing machine, and rotating steriliser—for the canning of milk products.

Chemistry

The chemical laboratory is under the control of Mr. Adam, assisted by Mr. G. Horner, M.Sc., D.I.C. The principal problem at present under investigation is concerned with the formation of hydrogen swells in canned fruits. In this form of spoilage, as the name implies, the ends of the cans are forced out by the pressure of hydrogen inside; the hydrogen arises as a result of the corrosion of the tinplate by the fruit acids. The most important contributory factors have been examined in detail during the past few years, and a bulletin incorporating the results of the experiments is in course of preparation.

A very thorough investigation into the tin content of canned fruit under different conditions of storage is also in progress in this department, and up to the present over one thousand analyses have been carried out.



Mr. J. Stanworth in the Physics Laboratory.

Other problems having a bearing on corrosion have been studied, and these comprise the changes in the composition of head space gases in canned fruit during storage, and the conditions governing the internal rusting of cans.

The effect of hard water in the canning of fruits and vegetables is also receiving attention, and although the investigation is not yet completed, results of practical value in the canning of dried peas have been obtained.

Micro-Biology

This department is under the direction of Mr. Hirst, and there are two research workers engaged in this section. The bacteriological work is in charge of Mr. N. B. McMaster, M.Sc., who, in addition to examining a large number of samples submitted by subscribers, is carrying out a bacteriological examination of canned foods to ascertain the types of micro-organisms which survive sterilisation.

An investigation carried out last year to ascertain the cause of bitterness in canned cream proved most interesting. The bitterness was shown to be due to the presence of a bacillus, the spores of which had survived sterilisation. The heat resistance of the spores was determined, and inoculated cans were sterilised for varying times at different temperatures. The information obtained enabled an adequate heat treatment to be suggested, and this proved successful in practice.

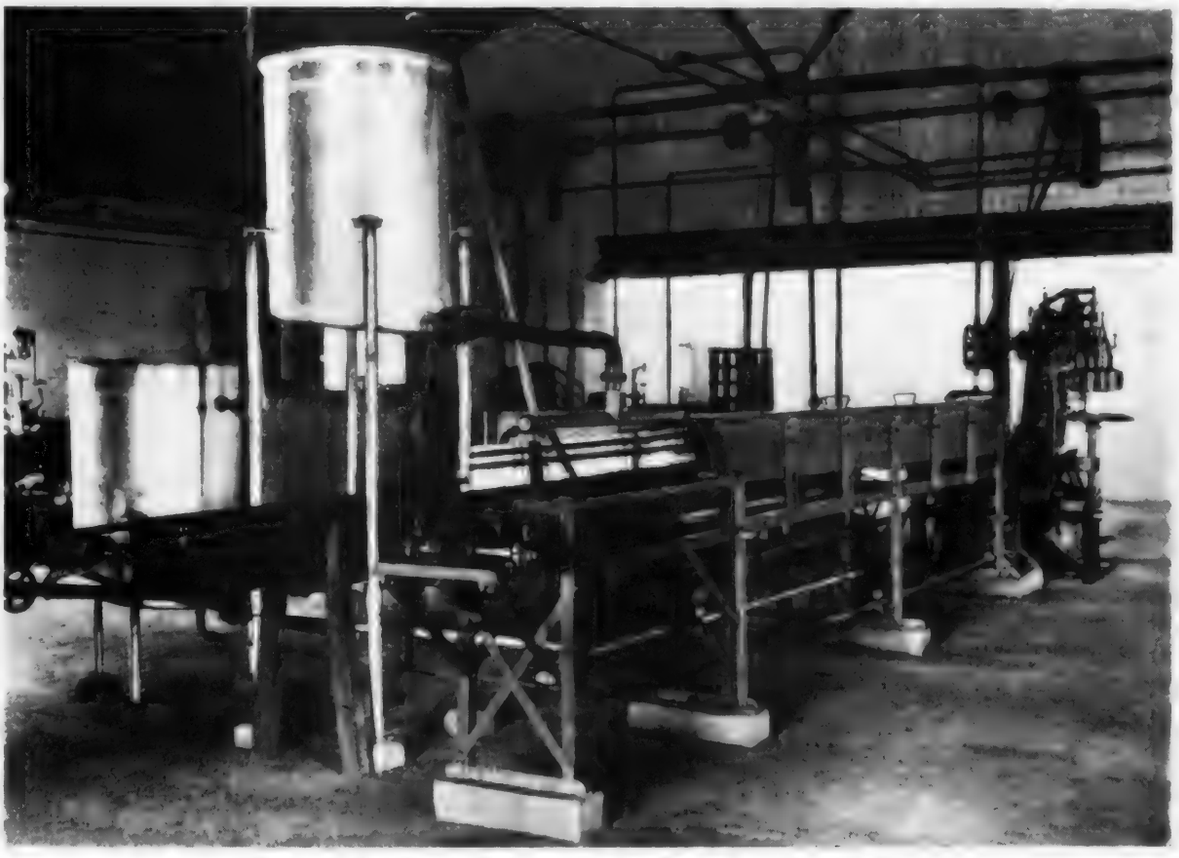
Mr. R. Hull, B.Sc., A.R.C.Sc., is engaged in studying the heat-resistant mould *Byssochlamys fulva*. This fungus, which is the cause of spoilage in canned and bottled fruits, is prevalent to a greater or lesser extent in most of the fruit-growing areas in this country. A preliminary memorandum circulated to the canners before the beginning of the canning season appears to have been helpful, and of the commercial cans recently examined only a very small proportion were found to be infected.

Bio-Chemistry

In this laboratory, Mr. G. S. Siddappa, M.A., a research student from India, is studying the changes in the starch and sugar content of peas during ripening. With some varieties the peas become over-mature and starchy very quickly, particularly during a hot season, and such peas are lacking in flavour and are corny in texture when canned. The problem is, therefore, of considerable importance to canners, and all the varieties commonly used for canning are being tested over a number of seasons.

Physics

There are many problems connected with the straining and distortion of cans, and these are being investigated by Mr. Adam and Mr. J. Stanworth in the physics



A Section of the Canning Department, showing the Small Canning Unit.

ABOVE: **Mr. G. Horner analysing Head Space Gases in Canned Fruit.**

BELOW: **A Section of the Canning Room for Dairy Products.**

laboratory. Several ingenious pieces of apparatus for measuring pressure, vacua, and other factors have been specially designed and made on the premises. Some of the results obtained have already been useful in connection with problems arising from the introduction of high temperature sterilisation in automatic pressure cookers. Thermo-couples and a small experimental retort are available for carrying out heat penetration tests, and the latter are of importance in connection with determining the time and temperature required for the sterilisation of new products.

Canning Room

The necessary machinery is installed for the carrying out of canning experiments on either a small or large scale, and several thousand cans are packed each year in connection with the various problems being studied. Two constant temperature rooms have been installed for the storing of cans at high temperatures in connection with the experiments on hydrogen swells, and good-sized chilling and freezing rooms are available for holding fruit and vegetables at low temperatures previous to canning.

Variety Trials

About two acres of land are cultivated for the growing of different varieties of vegetables for canning trials, and several hundreds of varieties have been tested as to their suitability for canning during the past few years. In addition to the varieties grown at Campden, the Station has collaborated with agricultural institutes in various parts of the country.

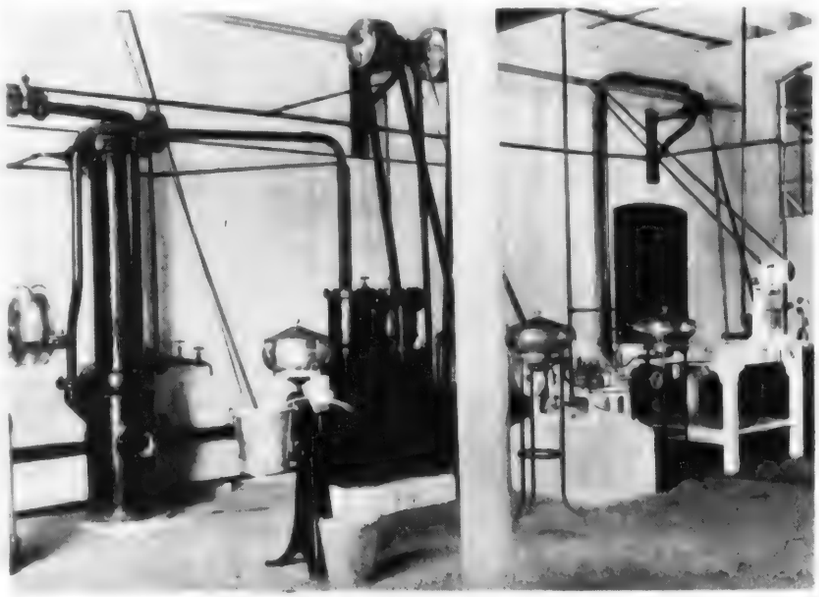
Advisory Work

In conclusion, brief mention must be made of the advisory work, which constitutes an important branch of the Station's activities, and last year approximately one thousand technical enquiries were dealt with. In addition to technical enquiries, many problems which arise in the canneries are submitted to the Research Station, and these are investigated in one or other of the laboratories. During the past twelve months about two hundred such problems have been studied.

National Mark samples are examined and reported upon to the Ministry of Agriculture.

During the summer of 1933 Mr. Hirst paid a visit to the United States, where he made an extensive tour of canneries and canning research stations. He discussed canning problems with the American research workers, and the visit will undoubtedly prove helpful in connection with problems at present being investigated and with the lines of research necessary for the further development and consolidation of the industry in England.

(*Continued on page* 385.)



SHRIMP CANNING

THE SHRIMP industry is most extensively developed in the South Atlantic and Gulf States of U.S.A., extending from Texas to North Carolina. The 1931 catch in this region amounted to 96,451,000 lb., representing 97 per cent. of the total quantity of shrimp caught in U.S.A. and Alaska. About half of this was used for canning in the 55 canneries which were operating in 1931 in the Atlantic region.

The Common or Lake Shrimp (*Penæus setiferus*) makes up about 95 per cent. of the catch, the rest being shared about equally by the Grooved Shrimp (*P. brasiliensis*) and the Sea Bob (*Xiphophenæus kroyeri*). The river shrimp industry, which is of minor importance, is mainly restricted to the lower Mississippi River and depends chiefly on *Macrobrachium ohionis*.

According to the investigations of Weymouth, Lindner, and Anderson (Bull. No. 14, U.S. Bureau of Fisheries, 1933), the life span of the Common Shrimp (*P. setiferus*) is limited to about one year. It is spawned in the spring or summer, apparently in outside waters, and, after spawning at the same season the following year, passes out of the fishery. Possibly the same applies to other species of shrimp.

The post-larval young, exceeding 7 or 8 mm. in length, first frequent warm, shallow, brackish waters with muddy bottoms. The young grow rapidly and they seek deeper waters of greater salinity.

During July, at an average size of 90 mm., they enter the commercial catch and remain until the following spring or summer, when they spawn and disappear at the age of one year. Their fate is unknown.

Like other shrimp, *P. setiferus* swims in two ways, usually forward, but sometimes it leaps backward. It spends most of its time at the bottom and occasionally buries itself in the mud. Worms, crustacea, small mollusks, and plant debris are all eaten. There is convincing evidence that the behaviour of the shrimp is influenced by temperature and salinity.

In fishing, the haul sieve was chiefly used prior to 1912, but now the otter trawl or shrimp trawl is almost exclusively employed in the Atlantic region. The motor-driven shrimp trawl boats of the South Atlantic vary in length from about 40 to 60 ft. with a draft of from 3 to 6 ft.

In Canada the shrimp catch for 1931 was 119,000 lb., practically all coming from the Fraser River and Howe Sound, British Columbia. *Pandalus danæ* is the most important commercial species.

The *Bulletin Statistique des Pêches Maritimes* gives the following landings for various European countries.

Sweden, 1,129,000 lb. of prawn (*Pandalus borealis*)
Norway, 2,974,000 ,, ,, ,,

	Prawn (*Palæmon serratus*).	*Shrimp* (*Crago vulgaris*).
	Lb.	*Lb.*
U.K. ..	49,000	5,891,000
France ..	461,000	3,448,000
Germany ..	11,000	31,153,000
Portugal ..	—	175,000

In Japan the 1930 catch of prawn and shrimp amounted to 45,747,531 lb. A large part of the catch is boiled and dried. It is stated that only shrimp taken in the Hokkaids area are suitable for canning, and in 1929 there were nine canneries.

Imports of dried prawn and shrimp into China in 1932 amounted to 5,284,426 lb. The common shrimp of the China coast belongs to the genus *Palæmon*, known locally as "Tuei Hsia", "Ming Hsia", "Hae", and "Abi". The 1932 catch of shrimp and prawn in the Swatow district was 43,228,000 lb. Large quantities of dried prawn and shrimp and steamed prawn are produced. Chefoo prawn are famous in China for their size and quality, and one cannery is in operation which packs about 25,000 lb. annually in ½ lb. gross weight cans, which are marketed in Manchuria and the interior.

Shrimp Canning Operations

Immediately on catching, the shrimp should go into an ice-box on board the trawler. If no such storage is available, they are placed overnight in cold store at the cannery. This chilling facilitates subsequent removal of the shell. In some cases the heads are removed before cold storage, as this reduces the susceptibility of the shrimp to spoilage. After death, the digestive juices in the "head" (cephalothorax) react with the flesh and accelerate its decomposition. Another advantage is that if the head is removed within 30 minutes or so after death the objectionable "black streak" (intestinal tract) is largely removed with it.

The shrimp are delivered in wire baskets to the picking (or peeling) tables, measuring about 18 ft. long and 3½ ft. wide. Here the heads are broken off, a section of the shell 1 to 1½ in. long peeled off, and the meat forced from the rest by giving the tail end a slight squeeze. The tables should be covered with slate or metal and thoroughly cleaned between operations.

The next step consists in thoroughly washing the meats. This is usually done in a series of tanks, but as there is considerable risk of contamination by bacteria, it is better to use a metal flume system of washing. If the tank system is employed, the

This article, and the one on Peach Canning, forms part of a book on the Manufacture of Foods, which is being prepared by the Editor, Dr. H. B. Cronshaw.

tanks should be made of metal (not wood), and the water should be kept in circulation and frequently changed.

The meats are next blanched or boiled by immersing them in wire baskets in tanks of boiling brine consisting, in general, of 1 lb. salt to each gallon of water. In order to avoid infection the tanks should be constructed of metal (not wood), and the same applies to the tanks in which the brine is made up. Heat is supplied by a steam-coil at the bottom of the blanching tank. The brine is changed after about four cookings. The time of blanching is usually 4 to 7 minutes for the wet pack and 7 to 11 minutes for the dry pack, but this time varies somewhat with the size of the shrimp, the degree of saltiness required, atmospheric humidity (especially for dry packs; higher humidity calls for a longer cooking), and the strength of brine used for filling the cans in the case of the wet pack.

The blanched meats are spread out on wire cooling trays and the material is picked over for legs, "whiskers", and any other bits of shell. It saves time and lessens the danger of contamination if the material is artificially cooled and cleansed by use of blowing fans.

After cooling, the material is graded according to size, and any foreign matter sorted out if this has not been done during cooling. Grading may be done by hand or by mechanical graders.

The meats are then filled into the cans or glass containers by hand. The amounts are checked by weighing.

The most popular size of canned shrimp is the standard No. 1 can which contains a minimum of 5 oz. of dry shrimp or 5¾ oz. of wet shrimp, drained weight. Other packages are No. 1½ tall cans containing a minimum of 8¼ oz. of dry shrimp or 9¾ oz. of wet shrimp, drained weight; the No. 1 squat can, with or without key, with the same contents as the No. 1 standard can; and smaller sizes containing 4 and 4½ oz. of dry shrimp and 4 oz. of wet shrimp which are employed largely in export packs.

Cans intended for the wet pack are conveyed under a perforated pipe from which they are filled with hot brine of about 2·5 per cent. strength (0·2 lb. salt to the gallon of water.)

Sealing on the lids is the next operation. The glass pack is sealed under vacuum. The heat-exhaust box does not appear to be used for cans, dependence being placed on the hot brine for creating the requisite vacuum.

The sealed cans are loaded into metal baskets which are lowered into the retorts. Each basket holds 14 to 15 cases of No. 1 cans and 2 or 3 baskets are retorted at a time. Processing takes place at 240° to 250° F. and under a pressure of 10 to 15 lb. The following times represent those in general use:

Size.	*Pack.*	*Time (Minutes.)*
No. 1 tin	Dry	60-75
No. 1 tin	Wet	10-12
No. 1½ tin	Dry	75-80
No. 1½ tin	Wet	14-15
Glass	Wet	13-18

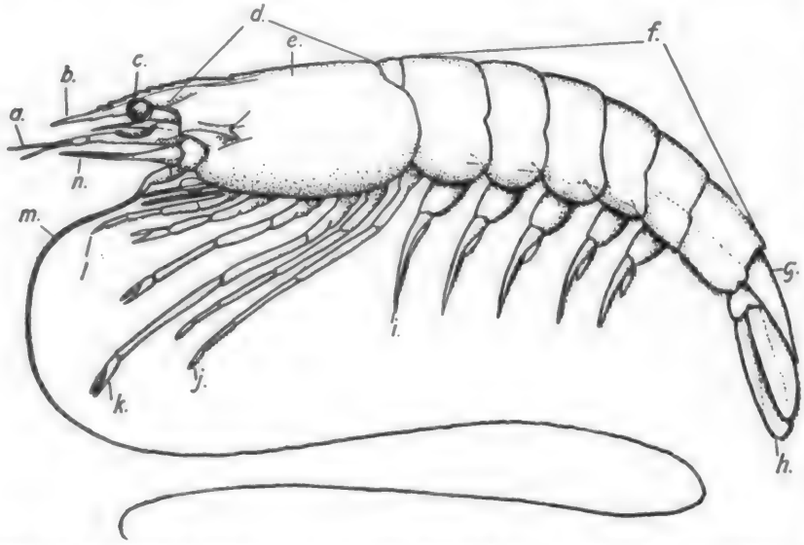
After processing the cans may be cooled either by turning cold water on them before removing from the retorts, or they may be removed and cooled in wooden vats constructed for the purpose. The glass pack is cooled in the retorts under pressure to avoid blowing off the lids.

The weight of shrimp meats as canned is estimated as representing between 25 and 27 per cent. of the weight of the whole fresh shrimp.

In the case of the dry pack, black sulphide discoloration of the shrimp and pinholing of the cans are avoided by internal lacquering or by lining the cans with parchment paper.

Another defect which sometimes appears in canned shrimp is the development of crystals of magnesium ammonium phosphate, or struvite (often mistaken for bits of glass—but they are harmless and dissolve readily in the stomach), which are formed after sterilisation by reaction between normal constituents of the shrimp meat. Occasionally, also, there is developed an odour of iodoform, which probably arises from certain marine organisms, such as *Balanoglossus*, that the shrimp have eaten.

Further information concerning the shrimp industry of the South Atlantic and Gulf States is contained in Investigational Report No. 21, by F. F. Johnson and M. J. Lindner, U.S. Bureau of

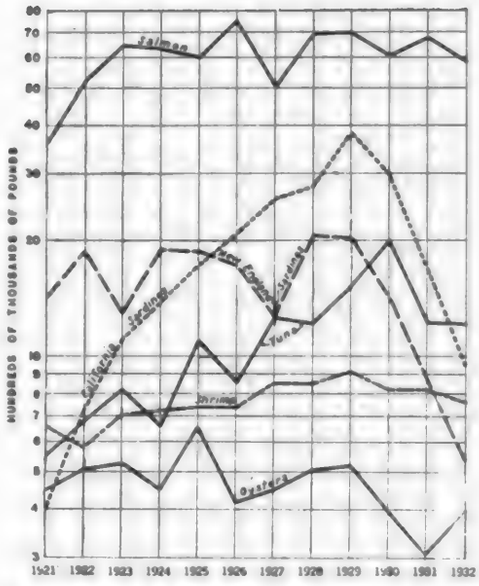


Side view of the Common Shrimp (*Penæus setiferus*) with some of the more conspicuous structures labelled: *a*, antennule; *b*, rostrum or "spine"; *c*, eye; *d*, cephalothorax or "head"; *e*, carapace or "head shell"; *f*, abdomen or "tail"; *g*, telson or "tail spine"; *h*, uropod or "tail fin"; *i*, first pleopod or "swimming leg"; *j*, fifth pereiopod or "walking leg"; *k*, chela or "pincer" of third pereiopod; *l*, third maxilliped; *m*, antenna or "whisker"; *n*, antennal scale or acicle.

Fisheries, 1934, from which most of the above account has been compiled.

As a result of their researches at the Laboratories of the National Canners' Association, Washington, E. J. Cameron and C. C. Williams have drawn attention to the dangers of bacterial contamination to which shrimps are exposed at the different stages of the canning process. They conclude that contamination may be divided into three stages. The first embraces the picking and washing operations. Here the bacteria were found to multiply very rapidly at the expense of the quality of the shrimp, but they are not of the spore-forming and heat-resisting variety, and are not, therefore, important in causing spoilage after the shrimp are processed. The second stage includes the blanching operation, and it was found that blanch tank contamination is an important factor in spoilage after processing. The brine tanks were also found to be contaminated with similar types of bacteria, but to a lesser extent. These observations led Cameron and Williams to recommend the replacement of wooden tanks by metal ones. The third stage follows blanching. While the shrimp are cooling and drying conditions are particularly favourable for bacterial growth. This stage is similar to the first with respect to the types of bacteria that are found.

In general, canners are advised to adopt the straight line type of operations. After grading, the shrimp should be canned as quickly as possible. It is a mistake to allow them to accumulate at any point, and the speed of the picking room should be regulated to that of the packing room.



Production of some of the more important Canned Sea Foods in the United States and Alaska.

MONUMENT TO CANNING!

"Things are not always what they seem"

THE committee of constitutional affairs of the Senate recently formulated a report recommending the sanction of a law authorising the Instituto Argentino de Cultura Británica to erect a monument to the memory of George Canning in the Plaza Británica. The measure was presented by Senator Rothe, who paid a brief but eloquent tribute to Canning, to whom he referred as "writer, orator, and eminent statesman who earned the highest honours from his country during his lifetime and whose remains at his death were laid beside those of William Pitt in Westminster Abbey". . . . "George Canning deserves of our country the erection of his statue in a prominent place in the city of Buenos Aires so that it may be thus presented to the veneration of all the inhabitants of America."

BRITISH CANNING RESEARCH

(Continued from p. 382.)

It is not possible to give anything like a full account of the activities of the Station in a brief article of this nature, and many problems in addition to those mentioned above are being studied. Enough has been said, however, to show that the canning industry is well served on the research side, and it is hoped that the Station will obtain the support it deserves.

The future of the Station will have to be reviewed next year when the present grant comes to an end, and it is hoped that all those connected either directly or indirectly with the canning industry will appreciate the importance of the work being carried out, and that the necessary financial support may be forthcoming in order that the future of the Station may be assured.

An Open Invitation

A hearty welcome awaits all our readers at "Food Manufacture's" Stand, No. 65, situated alongside the Garden, during the Canners' Exhibition from Nov. 2nd—10th, at the Granby Halls, Leicester.

(*Courtesy, Great Western Railway.*)

Polperro.

PILCHARD CANNING IN CORNWALL

By T. Crosbie-Walsh, F.I.C., F.C.S.

THE PILCHARD (*Clupea pilchardus*) is a member of the herring family, but may be readily distinguished from the herring by marked anatomical differences. The immature pilchard is the true sardine, and the fish takes two or three years to reach maturity and a length of ten inches.

It is one of the most important fishes in the English Channel. Essentially a Cornish fish (so far as this country is concerned), it is nevertheless to be taken along almost every part of the south coast of Devon.

Fishing starts at the beginning of July and catches increase up to the middle or end of August—even reaching into September—when the catches decline, although fishing goes on until October.

The pilchard migration is regular. Weather conditions exert the principal influence upon the catch, which varies considerably. This being so, it is difficult to estimate a fair average, but it may be taken at about 60,000 cwt. This would be enormously increased were there an outlet, such as a canning factory, for the fish. For the past thirty years there has been no public market for the fish. The Cornish fishing industry has been steadily declining for a number of years. For a short period during the war and for some time after there was a revival, but recently the decline has been so rapid as to cause grave anxiety for the future of the industry, the present position being so serious that it is threatened with extinction.

The Italian market for cured pilchards has fallen off and curing has been much curtailed. The boats have had recourse to other kinds of fishing, but they would, according to authoritative opinion, be available again if a cannery were erected to take the fish.

Supplies

There are sufficient pilchards in Cornish waters to supply not only the home market but also the markets of the British Dominions and Colonies, where a large demand for canned pilchards already exists, now being filled by the U.S.A.

It has been said recently that "the migration is so vast that probably Cornwall does not catch one out of a million of the migration." It is evident, therefore, that a pack of, say, 30,000 cwt. of canned pilchards would have little influence upon supplies.

With regard to possible competition from existing curers, which might raise the price to prohibitive figures for canning I quote the same authority. "There is no need to have qualms about the curers for the Italian market. . . . Italy is practically the only country which will take them at present; France, Spain and Portugal catch their own needs." Again quoting, "The additional demand for the fish would not necessarily cause the price to rise. The curers could not increase their offer to any appreciable extent. If they were to pay more they could not sell their cured product in Italy at a profit." Hence, if the cannery were to resist possible attempts at extortion, the fishermen would have no market at all for their catch.

Opportunities

Although the British consumer, outside Cornwall and Devon, is not acquainted with fresh pilchards as an article of diet, because they do not keep sufficiently long to enable them to be offered in distant markets, he is very well acquainted with Californian canned pilchards. Since the war, the popularity of the canned pilchard has increased yearly. In 1932 no less than fourteen million 1 lb. cans were exported by California to British Empire markets, and in 1933 Great Britain absorbed five million cans.

The Californian canneries have the advantage of deal-

ing with several types of fish at different seasons of the year and possess a large domestic market for such packs as tunny and mackerel, which allows them to sell the pilchard pack abroad at low prices.

With the canning of fruits and vegetables at saturation point and the establishment of new ventures, except at some specially favourable localities, not attractive, Cornwall would appear to possess the elements for the starting of an important cannery.

The Cornish pilchard is almost identical with the Californian variety (*Clupea sagax*) and is said to contain a larger proportion of oil, which is an advantage.

Extending Operations

To confine the operations of a cannery to pilchards alone would be to have the factory idle for nine months in the year and to be faced with the necessity of an annual "breaking in" of operatives, not to speak of the many other costly disadvantages of a short seasonal packing.

Mackerel and shell-fish offer opportunities for manufacturing during some of the months when pilchards are not available, and, with other products, would enable the factory to be worked for a good part of the whole year. Filleted mackerel in oil is an attractive pack. The western mackerel fishery is an important one and is carried on by the east coast steam drifters. The season begins in March and goes on till the end of May. Another source of supply might be from boats loading mackerel during the pilchard season, in August and September. In the summer it is difficult to find a market and the fish may be obtained cheaply.

As regards shell-fish, the female of the Great Crab (*Cancer pagurus*) is plentiful but the market is poor. There is another variety—the Spider Crab—which is eaten locally but for which there is no sale. Its similarity to the Japanese Spider Crab, which forms the basis for a large canning industry in Japan, suggests a possible outlet for the Cornish variety.

The canning of poultry in various forms would offer still another activity during the months the factory would otherwise be idle. The poultry industry in Cornwall is a large one. Agricultural and dairy produce is cheaper than in any other part of England. There are no large markets near at hand capable of absorbing the output of the farms. The canning of poultry would be carried out under particularly favourable auspices, as overhead expenses would be considerably reduced, being spread over the whole of the operations of the factory.

Several by-products should be worked profitably. Oil and fertiliser would be produced in large quantities. A number of other products, such as soups, pastes, and meat products would also be included in the programme.

Up-to-date Practice

Returning to the subject of pilchard canning, it would be incumbent upon the Cornish canner to employ the most up-to-date methods. Nothing less than a pack the equal of, if not better than, the Californian would be any use. And there is a high standard of packing to imitate—or excel! Tinkering would be fatal. "Trying it out", with inadequate plant, "just at first—to see" (one hears that phrase often)—would not be caution. It would be suicide.

Californian Methods

The methods of pilchard canning in California vary considerably in the different factories. In general, the raw fish are placed in a can and receive a pre-cooking —almost a frying—prior to being sealed and sterilised. The temperature of this pre-heating varies according to the particular process employed. Sometimes it reaches as high as 500° F.

The following is a description of the procedure carried out in one factory:

The fish are unloaded from the fishing boats into

St. Ives Harbour.

(*Courtesy, Great Western Railway.*)

(*Courtesy, Great Western Railway.*)

Mevagissey.

barges fitted with high sides. From these barges the fish are piped through eight-inch pipes to the cannery, the pump being a single-blade propeller type. In carrying the fish from the barge to the cannery through the pipe line, plenty of salt water is taken along so that there will be no clogging, and the agitation of the fish by the turbulent water is sufficient to rid them of scales.

The fish are immediately butchered, care being taken to leave the skins intact.

They are then filled into the cans, the gross weight being from 16½ to 17 oz. for a 1 lb. oval. In some cases the gross weight is much less, but it depends upon the treatment given subsequently. A light brine (3 per cent. salt) is added before the cans are sent on their way to the baking oven, although this preliminary brining is omitted in some factories.

The temperature of the baking ovens is controlled with considerable exactitude, as the baking process determines the nature of the final pack.

The can enters the baking oven, the temperature of which is 200° F. It is considered important to keep the temperature low at the first stage. If it is too high there is a tendency for the fish skins to stick to the bottom of the can. The can travels along the oven and in from ten to twenty minutes emerges. The temperature of the oven at the point of emergence is 220° F. The cans at this point are tipped to expel the oil and water which have been liberated from the fish by the heat. They are then carried on to another oven by a conveyor chain. The temperature of the second oven is 270° F. The cans remain in this oven long enough to attain 220° F. There is not a great deal of moisture lost in the first process. The cells of the fish contain expanded water, and as soon as the cans enter the second oven these cells burst and lose their excess water. A sudden subjection of the cold fish to a high temperature has not the same effect as that of preliminary heating.

On emerging from the second oven, the cans are again drained from the further quantities of oil and water which have been liberated.

The cans are next re-filled with oil or tomato sauce in such quantity as will give the net weight of 1 lb. plus a small overweight.

The cans are next carried to the double seamer and from thence to the can washer, and from there to the retorts.

The temperature of retorting is 240° F., and each factory has its own particular time of sterilisation, somewhere around seventy-five minutes.

Vacuum sealers are not used, the vacuum in the can being obtained by closing promptly and as hot as possible, after the cans come out of the final oven.

A considerable number of modifications to the above suggest themselves. The principal object to be aimed at is to expel moisture to a fixed amount. On this depends the nature and palatability of the pack. Cooking in the can instead of prior to canning is a great economiser of labour and tends to enable the canner to get a more standard product.

Vacuum sealing would increase the vacuum in the can, which would be a doubtful advantage, as it would not enable the ovens to be dispensed with. These ovens serve the dual purpose of cookers and exhausters.

DIET FOR HEALTHY TEETH

A SPECIAL report (No. 191) was recently published by H.M. Stationery Office for the Medical Research Council. This consisted of the third part of a study by Mrs. Mellanby, entitled "The Effect of Diet on Dental Structure and Disease in Man".

This is a very important document, and has already raised nutrition above oral hygiene as the chief means of protecting the teeth. Mrs. Mellanby's work has shown that both structure and subsequently health of the teeth can be largely controlled by certain specific dietary constituents; vitamin D (found in egg yolk, animal fats, cod liver oil, milk, etc.) is prominent among protective substances, and, a fact that will surprise many, cereals (oatmeal, bread, etc.) provide the best example of harmful foods.

Another outstanding feature of the experimental work was the demonstration that a deficiency of vitamin A or carotene played an important part in the development of the periodontal tissues and in the control of the onset of periodontal disease, including pyorrhœa.

This document deserves the careful study, not only of the medical profession but of the general public also, and particularly of those concerned in any way with foodstuffs, for it is rightly said that "with better structure of dental tissues and increased resistance to bacterial invasion there is every reason to believe that both dental caries and pyorrhœa will cease to be the scourge they are at the present time".

BOTULINUS
and the Control of Canning in the U.S.A.

By F. Hirst, M.Sc., A.R.C.Sc.
(Director of the University of Bristol Research Station, Campden, Glos.)

THE CONSUMPTION of canned foods in this country runs into millions of cans annually, and the number of authentic cases of illness that can be traced to this class of food is infinitesimal. There is no doubt that modern canned foods are safer than many types of fresh foods which are handled in wholesale markets and retail shops before being consumed. Cases of food poisoning in which canned food is suspected are, however, often referred to in the press, and the publicity thus given reacts adversely on the whole of the canning industry. It behoves every canner, therefore, to take all possible steps to ensure that his products are as safe as modern science can make them.

The majority of cases of food poisoning are due to the food being infected by certain bacteria or by the toxins or poisons produced by these bacteria. Of the latter there are two main types responsible for food poisoning, namely, the *Salmonella* group and *Bacillus botulinus*. The former are very rare in canned foods, and illness arising from food infected with micro-organisms of this group more often results from the consumption of so-called fresh foods, particularly during the hot months of the summer. *Bacillus botulinus* is still more rarely present in foodstuffs, fresh or canned, and in the whole of Europe only about seventy-four outbreaks have been recorded, while in the United States there have only been 191 outbreaks between 1899 and 1932. In Great Britain there has only been one authentic case, and that occurred in 1922 when eight people died after eating sandwiches made from a jar of wild duck paste.

The illness, which is often fatal, is due to the toxins produced in the food in which the micro-organism is living. The bacillus was originally described and named by van Ermingem following an outbreak of food poisoning in Belgium in 1895. In Europe, botulism has usually been associated with meat and fish products, the majority of the cases having arisen from the consumption of ham and various types of sausages; canned food has rarely been involved.

It is only during the past 20 to 30 years that outbreaks of botulism have been associated with the eating of canned foods, and the majority of these have occurred in California and other Western States in America.

Research Investigations

The subject began to receive attention in the United States in 1914, when there was an outbreak arising from the consumption of home-canned string beans at Stanford University. This started an investigation which was carried on in a small way until about 1920, when there were several cases which were definitely traced to canned foods packed on a commercial scale. These outbreaks naturally created a prejudice against canned foods, and the canning industry decided to finance a thorough investigation of the subject. The work was carried out at the Havard Medical School in the Eastern States, and by the Medical Department of the University of California and Stanford University on the Pacific Coast, with the co-operation of the United States Public Health Service. The leading men concerned with this research, which is now world-famous, were Dr. K. F. Meyer, Dr. J. R. Esty, Dr. J. C. Geiger, Dr. D. C. Dickson, and their associates.

Apart from the work on *Bacillus botulinus*, an extensive research programme on the processing of canned foods was arranged by the National Canners' Association. This work, which included experiments on heat penetration in canned foods, and heat resistance tests on the spores of *B. botulinus* and allied anaerobic

The Thermal Death Point Apparatus at Campden Research Station.

bacteria, was of a fundamental nature, and some valuable information was obtained. The discoveries made in the laboratory were tested out in the canneries, and thousands of cans were packed and sterilised experimentally. The investigation covered all commodities packed in tinplate containers, and the cans packed under commercial conditions were transferred to the laboratory, where they were incubated and subjected to bacteriological examination. When the work was completed the National Canners' Association were in a position to publish adequate times and temperatures of sterilisation for practically all types of canned foods.

Although the safe times and temperatures were available to the canners, it was not possible in all cases to get them adopted. Many of the packers had been packing certain products for long periods without having experienced any trouble, and they feared that the extra heat treatment recommended would spoil the texture or flavour of their products.

Introduction of Control

Subsequent outbreaks of botulism arising from canned foods packed on a commercial scale made the canners realise the seriousness of the situation, and in 1924 the industry petitioned the State Board of Health of California to create a Division of Cannery Inspection. The work was at first financed by the State of California, but as it progressed, and as the industry began to realise the importance of it, the canners voluntarily offered to finance it. In 1925 the legislature introduced a Bill creating a Division of Cannery Inspection (Chapter 428, Statutes 1925). This is worded as follows: "An Act to regulate the conduct of canneries, to create a division of cannery inspection to carry on such regulation, to provide rules regulating the proper sanitation of canneries, under the State Board of Health." Under this Act the canning of vegetables, meat, and fish products on a commercial scale can only be carried out under licence, and before a licence can be obtained evidence must be supplied to show that the cannery is equipped with one or more pressure cookers fitted with indicating thermometers, recording thermometers, and pressure gauges. It is also laid down that the sterilising operation may only be carried out by a person in possession of a permit issued by the State Board of Health.

The money for the financing of the scheme is obtained by means of a small levy of twenty cents per thousand cans, and it is collected by the can manufacturers.

A chief inspector administers the work of the division and is responsible to the director. There are also, a supervising inspector, fifteen full-time cannery inspectors, and twenty temporary men employed during the canning season.

Definite rules and regulations regarding the fitting and working of retorts and the times and temperatures to be applied in the sterilisation of any product have been adopted and must be adhered to.

Each cannery has a recorded die code assigned to it each year, and this has to be embossed on the canner's end of the can at the time of sealing. This code mark enables the department to identify the packer and the year of pack of any can. In addition, each batch of cans sterilised has to be numbered and the particular batch number is stamped on the end of each can in Indian ink.

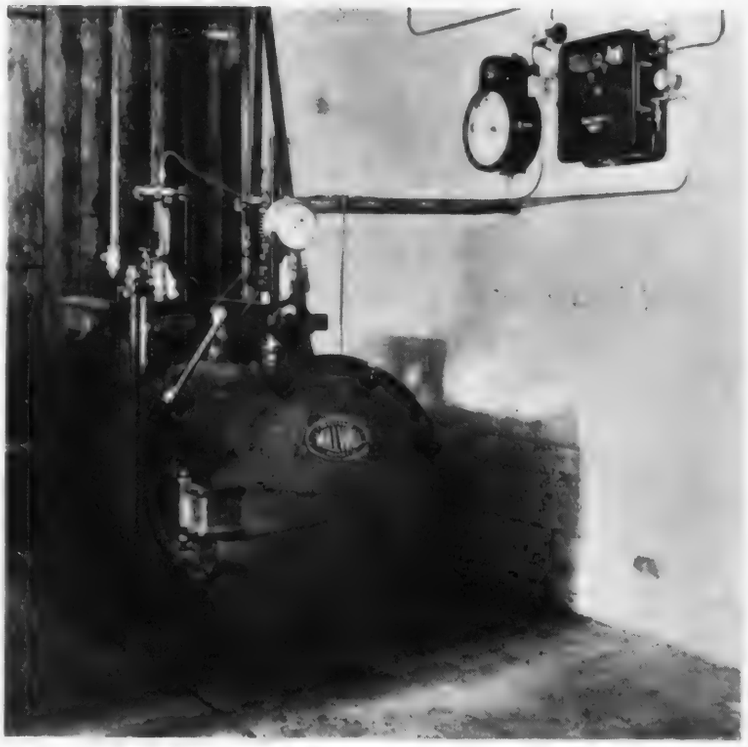
Each batch processed under the regulations of the

Mr. R. Hull and Mr. N. B. McMaster working in the Bacteriological Laboratory.

State Department of Public Health has to be covered by a production record made out in the handwriting of the person in charge of the retorts. This record must show the total number of cans in the batch, the size of the cans, the code used, the time when steam was turned on, the time when the required temperature was reached, the time when the cans were removed from the retort, as well as two readings of the mercury thermometer, two readings of the recording thermometer, and two readings of the pressure gauge. The recording thermometer charts and production records must bear the stamp of the State Department of Public Health, Cannery Inspection, and must be initialled by the inspector in that territory. No blank charts are allowed to be used.

All mercury thermometers and pressure gauges have to be calibrated by the State Department of Public Health prior to the starting of each season for such products that come within the regulations, and the Department must be notified when any new equipment is purchased for use on the retorts.

The canner is not allowed to vent and reseal swells or flippers even though the contents may be good. No material is allowed to stand overnight in cans, sealed or unsealed, without being sterilised in the retort. When a cannery is observed to be misbranding or otherwise violating the Pure Food Laws, it is called to the attention of the officials, and if not corrected a restraining order is applied to the material in question.



Small Experimental Retort fitted with Fully Automatic Temperature Control.

Success of the Scheme

In the early stages there were many difficulties to be overcome. Men had to be carefully selected and trained as inspectors. Many of the canners were prejudiced against having inspectors in their factories, but this gradually died down and the Act appears to work satisfactorily. Many of those who were most against the innovation are now the keenest supporters of it, and it is interesting to note that since the Division of Cannery Inspection was formed there has not been a case of botulism arising from the consumption of canned food packed on a commercial scale in California. Imported canned vegetables, meat, and fish products are also carefully examined by the State Board of Health, and any consignment about which there is any doubt can be seized, and, if necessary, condemned.

Tomato products were not originally included, as it was found that the acidity of these products inhibited the growth of *B. botulinus*. The canners of such products, however, appreciated the advantages to be gained through the inspection service, and they have, at their own request, been included in the scheme, and they now have their products inspected along with the others. This would indicate that the scheme has worked successfully.

Bacillus botulinus is a soil organism, and fortunately it is much less prevalent in English soils than in those of California. Of 64 samples of English soils examined by Dr. Meyer in 1921, only five showed the presence of *B. botulinus*, and two others yielded weakly toxic cultures (11 per cent. in all). In comparison, Meyer and Dubovsky found 57·6 per cent. of the virgin soils and 26·1 per cent. of the cultivated soils of California contained the bacillus, and they made the observation that this micro-organism is found in the greatest abundance in soils that have never been cultivated, and that it is less prevalent in cultivated regions.

As stated previously, there has only been one case of botulism in this country, and it would not appear, therefore, that such stringent regulations as are outlined above need to be enforced in England, but it might be advisable to stipulate that any firm not familiar with canning who contemplated packing meat, fish, or vegetable products should in all cases be compelled to use pressure cookers, and that the times and temperatures used for the purposes of sterilisation should be approved by a recognised research centre or by the Ministry of Health.

In the summer of 1933 the writer visited the research stations connected with the canning industry in America, and during the visit he had the privilege of meeting several of the men who took a leading part in the botulinus investigation. He also met Mr. Milton P. Duffy, chief of the Division of Cannery Inspection, who kindly supplied him with much information about the Cannery Inspection Service.

Asparagus Fields in the Sacramento River Valley.

CANNING ASPARAGUS IN CALIFORNIA

BY

ANWAR SHALLAH

IT IS said that the first attempt to can asparagus in the United States was made in New York State in 1864, although it was many years later that an important asparagus canning industry was established. The first large asparagus cannery in the United States was constructed in 1892 in the present asparagus region in the delta of the Sacramento River of California. Since that time the number has increased and reached twenty canneries in 1924. The total pack of asparagus reached 2,673,000 cases in 1929. The depression, however, has decreased the total pack. It was only 1,313,000 cases in 1932. The pack increased again in 1933 to 2,135,000 cases. It has been estimated that the present acreage of asparagus in Northern California is about 66,900 acres, with no further tendency toward increasing the plantings.

The expansion of the industry has not only been due to increase in the domestic demand within the United States, but, as was the case with other canned products of California, it has been due in large part to increased foreign demand. Before the development of the asparagus canning industry in California, most of the canned asparagus used in the United States came from France. The imports have been checked, however, and were only 526 lb. in 1922.

The exports for the last three years are as follows:

Year.	*Quantity in Pounds.*	*Value in Dollars.*
1931	13,372,000	1,934,000
1932	10,880,000	1,352,000
1933	15,725,000	1,590,000

France is the largest customer for Californian canned asparagus. In 1932, for example, 32 per cent. of the exports went to France alone, and 12 per cent. to England. Switzerland, Belgium, and Japan are next in importance as outlets for the Californian canned asparagus.

In the early years of the industry, asparagus-growing in California was distributed among many localities. At the present time, however, the tendency has been toward concentration in those areas where natural conditions are most suitable for the production of high quality asparagus. The reclaimed area of the delta of the Sacramento River is by far the most important producing district, although the Imperial Valley and the San Fernando Valley are still large producing areas. The two last-named districts produce asparagus mainly for shipment to the fresh markets, while the delta production is both for the fresh market and for the canneries. The importance of the market for fresh asparagus in the eastern United States can be ascertained from the fact that in 1932 California shipped 3,431 carloads (probably about 40,000 tons).

The delta region is very well suited to the cultivation of asparagus for the following reasons: First, the soil is a peaty, porous loam which permits the stalks of asparagus to develop without distortion and permits them to reach a large size in the short growing season. Secondly, the soil contains much river sediment; thus it is rich in plant foods. Third, the dry climate and the relatively high soil temperature act as natural control agents against the asparagus rust and the asparagus beetle.

Most of the asparagus canneries are located either on or near the Sacramento River, giving the canneries low transportation charges for their fresh asparagus and for shipping the canned products. Securing a satisfactory labour supply for the canneries has been a serious prob-

lem owing to their distance from large cities. Many of the asparagus canneries in that region have built cottages and recreational accommodations for their labourers, for which no rent, or a very nominal rent, is charged.

The Canning Procedure

The cutting season for asparagus in California begins usually between March 15 and April 1. Owing to the high prices for early shipments of fresh asparagus the first cuttings are made only for the fresh market, which calls for green rather than white asparagus. Consequently, only green asparagus is cut during the first two weeks. The stalks are allowed to grow to the desired length above the ground before cutting. Formerly only white asparagus was canned, but in recent years the pack of green asparagus has increased at a surprising rate. In producing green asparagus the surface of the ground is flat or is left in low ridges. After the cutting for fresh markets is over, the soil is "ridged up" along the rows to cover completely the stalks, in order to produce the white asparagus. Each day the spears are cut with a chisel-shaped knife

Cutting and Collecting Asparagus for Canning.

to a length of approximately nine inches before the tips see the sunlight. On this account the stalks develop little or no chlorophyll or green colour. The entire asparagus field is cut daily during the cutting season in order to make the collection of the stalks before they appear over the surface, thus reducing the production of green asparagus.

Washing and Grading

The asparagus is immediately taken to the washing shed where it is roughly cut to uniform length, washed, and hauled to the cannery in lug boxes. Since fresh asparagus deteriorates and dries very rapidly, it should be canned within a few hours after picking and should not be left until the next day.

In the cannery the boxes are first washed in order to remove adhering soil and to keep the stalks from drying. The general procedure followed by most canneries is first to sort the stalks by hand according to their diameter and colour, after the elimination of blemished, crooked, insect-injured, and otherwise cull stalks. Each grade is placed in a small wooden box holding about 3 to 4 lb. These boxes are conveyed on an endless belt to the trimming crew and passed by hand under a revolving circular knife which cuts the spears accurately to the desired length.

Each grade is placed in a separate basket. Each basket is rinsed under sprays or dipped in cold water in order to aid in washing and to keep the spears plump.

Blanching

The asparagus is then blanched, this being accomplished by dipping the baskets in boiling water for two to three minutes, depending upon the size of the stalks. The purpose of blanching is, first, to remove some of the mucous-like material from the skins; second, to make the stalks pliable and thus lessen the danger of breaking them during subsequent handling. Thirdly, it softens the stalks, so that they will be packed more tightly in the cans, and cleanses them. The baskets are finally dipped in cold water in order to cool them and make it convenient for the canners to pack them.

The blanched stalks are placed in sinks at the canning tables and covered with cold water. Here they are given an additional grading for size and colour and placed in cans, every can being filled by weight. A No. 2½ square can has about 20 oz. of asparagus.

Grades

The most popular cans for asparagus are the No. 2½ and the No. 1 square cans, owing to the fact that after cooling the vacuum produced within the can draws the six sides inward and holds the spears tight without any injury to the tips. In the round cans, where only the two ends are drawn in, there will be more freedom of movement, which may result in an injury to the blossom end of the spears.

The No. 1 square can is used for canning the tips (short stalks). Other popular sizes of cans are the round No. 1 tall and the round Picnic.

The following size grades are made: Giant, Colossal, Mammoth, Large, Medium, and Small; the larger sizes being more in demand. The following colour grades are made: (1) natural or ungraded—*i.e.*, a mixture of white,

Battery of Horizontal Retorts used for Cooking Asparagus under Pressure.

Continuous Washing Machine. Note trucks in foreground after washing, and one in the background before washing.

Side View of Grading Machine. Note rubber cables and baskets used for Blanching.

The feeding end of the Automatic Cutting Machine.

pinkish, and green stalks; (2) white—*i.e.*, completely white stalks; (3) pink—*i.e.*, stalks having a colour midway between the white and the green—this grade will become white upon storage in the cans for a few months; (4) green, which refers to those stalks that are cut as white asparagus, but due to their greenish colour they have to be graded by themselves and canned as green. There are two green classifications: "all green" and "green tips". A small quantity of asparagus is peeled by hand and packed for a special trade. Asparagus soup cuts are made from stalks that cannot be canned under the above grades; they are cut into short lengths before canning.

Exhausting and Processing

The filled cans are exhausted for about four minutes at 190° to 205° F. and sealed hot; or are vacuumised mechanically and sealed under vacuum. The cans are cooked at 248° F. for different lengths of time depending upon the size of the can. The Department of Public Health of the State of California fixes fifteen minutes for the No. 2½ square at 248° F. Another processing time in use in some canneries is 240° F. for twenty-three minutes. Too prolonged processing or too high temperatures impart a "scorched" taste. The processes given above are very near the "scorch line" in order to ensure sterilisation.

Automatic Machinery

The washing, grading, and blanching operations are done by hand in most canneries. There are, however, a few canneries in which have been developed machines which accomplish various operations efficiently and more nearly continuously. One cannery has a washing machine where the hand-truck holding five lug boxes of asparagus is conveyed under water automatically. The blanching operation also is made continuous by passing the baskets of asparagus on a chain conveyor through cold water, boiling water, and cold water again respectively. The speed of the conveyor is so adjusted as to give the asparagus a blanching time of about two and a quarter minutes.

There is also a machine which grades the asparagus for size according to its length as well as to its diameter. The asparagus stalks are placed on a short roller conveyor which feeds them uniformly on to a double chain conveyor. Here the stalks are laid one at a time with a uniform distance between each two, and are conveyed against a stationary knife placed at the end of the chains. Consequently they are cut uniformly to the desired length.

By means of an elevator the stalks are fed on to five endless rubber cables travelling continuously. The distance between each two cables is so adjusted that it is narrow at the feeding end and enlarges as it approaches the opposite end. The stalks are conveyed between these cables and they drop to the chambers below as they encounter a space wide enough to allow them to drop between the conveyor belts. Those of small diameter drop near the feeding end, while those of large diameter drop through near the exit end. Each size grade, thus

segregated, falls into a basket placed below. This machine has not been perfected, but will probably eventually be made to size grade asparagus very satisfactorily.

The Canned Asparagus Marketing Agreement

In accordance with the aims of the new economic policy of the United States Government, there has been established a marketing agreement for canned asparagus under the Agricultural Adjustment Act approved by the United States Congress on May 12, 1933. Similar agreements have been established for fresh asparagus, the fresh gravenstine apples, walnuts, and several other agricultural commodities in California. Furthermore, similar agreements are being considered for canned pears, canned peaches, and canned tomatoes. The following quotation will give some of the aims of such agreements:

"(*a*) In order to establish and maintain such balance between the production and consumption of agricultural commodities and such marketing conditions, therefore, as will re-establish prices to farmers at levels that will give agricultural commodities a purchasing power with respect to articles that farmers buy, equivalent to the purchasing power of agricultural commodities in the base period, the base period in the case of all agricultural commodities except tobacco being the pre-war period, August, 1909, to July, 1914, and in the case of tobacco the base period being the post-war period, August, 1919, to July, 1929.

"(*b*) To approach such equality of purchasing power by gradual correction of the present inequalities therein at as rapid a rate as is deemed feasible in view of the current consumptive demand in domestic and foreign markets.

"(*c*) To protect the consumer's interest by readjusting farm production at such level as will not increase the percentage of the consumers' retail expenditures for agricultural commodities or products derived therefrom, which is returned to the farmer, above the percentage which was returned to the farmer in the pre-war period, August, 1909, to July, 1914."

The agreement includes all the canners of asparagus in the State of California, and provides for the election of a "Control Committee" consisting of eleven members. Five members of the committee are chosen from the asparagus producers, five from the asparagus canners, and one member is neither a producer nor a canner.

The duty of the committee is to supervise the performance of the agreement. The committee has already fixed April 1, 1934, as the opening of the canning period; has limited the pack to a maximum of 1,900,000 cases, and will fix a closing date for such canning period, after which no canner will be able to operate on asparagus.

The agreement has set only two grades of asparagus that can be canned, the No. 1 white and the No. 1 "all green". No inferior grade will be canned this season. The agreement will continue in force until March 31, 1935. The canners have bound themselves not to sell canned asparagus prior to March 1, 1935, except from the past packs or from the 1934 packs.

It is expected that by limiting the pack to as low a level as 1,900,000 cases there will be a better yield both to the producers and the canners. At present the canners are paying 3 cents a pound for white asparagus after culls are removed (amounting to about 5 to 6 per cent.); 3½ cents a pound is paid for much of the green asparagus.

Blanching Asparagus.

PEACH CANNING

PEACH CANNING is one of the most important sections of the canning industry in California, and between 1920 and 1930 the pack increased by about 100 per cent. Before the depression the annual pack of this fruit throughout the State was in the neighbourhood of 300,000 tons, or, in other words, about two-thirds of the total Californian pack of fruit. There are about 100 peach canneries in the State, and mass production methods are the rule. Machinery is used wherever possible, and some of the larger canneries are equipped to turn out over half a million cans per day.

Varieties

Clingstone types are most suitable for canning, and the best varieties are Tuscan, Peak, Pelora, Haus, Sims, and Phillips. The last named is the most important of the varieties used; Tuscan comes next, and about three-quarters of the total pack consists of these two varieties. The fruit is picked when firm ripe, and great care is taken to avoid bruising during picking and transport.

Preparation

On arrival at the cannery the fruit is carefully sorted according to quality. The next operation is that of halving and the removal of the pits. In some of the smaller canneries this operation is still done by hand, but machines which have been evolved for the purpose are now used in most of the large factories. The halved and pitted fruit is then passed through a lye bath, where it is immersed in—or subjected to sprays of—boiling lye solution. The strength of the latter varies from 1 to 3 per cent. of sodium hydroxide, and the time of treatment is generally about fifteen seconds to two minutes, depending upon the variety and maturity of the peaches. This is followed by a thorough washing in cold water to remove any adhering lye solution. If necessary, the fruit is then blanched for about two minutes in steam or hot water to prevent browning which results from the action of oxidising enzymes, although the heat of the lye bath is generally sufficient to destroy the enzymes. The peeled

Preparation Department.

fruit is then carefully sorted, and any blemished, broken, or badly peeled halves are removed.

Grading

The prepared peaches are next graded for size, and this operation is carried out mechanically. The machines consist essentially of a series of vibrating copper screens with circular openings of various diameters. It is usual to separate the fruits into five sizes; the smallest is designated Pie Grade, and the largest is often sliced before canning. The rest is classified as Fancy, Choice, and Standard, according to quality and size.

Filling

In the most up-to-date factories the empty cans are transported over the top of the filling tables, and a short branch staggered gravity-conveyor delivers the cans direct to each filler. At the end of each of these short run-ways there is a can counter and marking device, and the latter applies a number and some special mark to denote the grade in indelible ink on the body of the can. The number is that of the woman who is filling at that particular spot, and thus when cans are subsequently examined in the sampling room the filler of any unsatisfactory can may be traced without any difficulty. The filling tables are equipped with enamel or monel metal sinks to which running water is laid on. The graded halves are carried to the filling tables on belt conveyors, and the fruit is diverted into the sinks by means of movable gates attached to the back of the sinks, and which—when open—swing across the belt, thus guiding the fruit into the sinks. The cut halves are kept immersed in water until they are filled into the cans. The fillers generally pack a specified number of pieces into each can, and they endeavour to select fruit of a uniform colour.

Syruping

The filled cans are transported to the syruping machine on trays or conveyor belts, and before entering the machine they are automatically drained of any water carried over from the filling tables; an illustration of the drainer appears on page 410. The syruper fills a definite quantity of syrup into each can, and it is generally adjusted to fill within about a quarter of an inch of the top of the cans. This gives each can approximately the same headspace, and prevents over-filling. Three strengths of syrup are used according to the quality of the product. The Fancy pack is put up in a 55 degree, the Choice in a 45 degree, and the Standard in a 40 degree syrup, and the syrup is generally added at a temperature of 160° to 180° F.

ABOVE : **The Canning Lines.**

BELOW : **Labelling and Casing Cans in the Warehouse. Markers are placed between each four rows of cans to facilitate counting for inventory.**

Exhaust

From the syruping machine the cans pass on to the exhaust box, where they are heated by means of steam or hot water for five to six minutes at 180° to 190° F.

Sterilisation and Cooling

The cans are sealed immediately after the exhaust process, and they pass at once to the cookers, which, in most of the larger factories, are of the automatic type. The time of cooking depends on the heat treatment given in the exhaust process, the condition of the fruit, and the size of the cans. It is generally about twelve to twenty minutes at boiling temperature.

A Peach Grader.

Peaches should be thoroughly cooled to a temperature below 100° F. immediately after processing.

Browning

Cruess, Quinn, and Mrak (*Fruit Prods. J.*, August, 1931, and October, 1932) have investigated the browning of peaches during preparation for canning. They state that it is caused by oxidation of a catechol tannin (possibly phenol catechol) or related compounds. The oxidation is induced by the enzyme oxidase. This is destroyed by heating at 180° to 212° F., or by the presence of SO_2, and is inhibited by high acidity or the chloride ion (*e.g.*—presence of salt).

In order to arrest browning the authors recommend dipping the lye-peeled, well-rinsed fruit in dilute hydrochloric acid (about ½ per cent. HCl), followed by rinsing in water to remove the acid. Dipping in dilute citric acid is less effective.

Particulars of Packs

The following table gives (according to Tilgner) the number of halves packed in cans of various sizes:

	8 oz., 2 in. High.	8 oz., 3½ in. High.	Picnic.	No. 1 Flat.	No. 1 Tall.	No. 2 Tall.	No. 2½.	No. 3
Fancy	4	5	6	7	8	9	12	14
Choice	5	6	7	9	10	12	15	18
Standard	7	7	11	11	13	15	21	25
Minimum number per Can	3	3	3	3	4	4	6	6

The photographs illustrating this article, together with that on page 410, were kindly supplied by the California Packing Corporation, and show their Sacramento Plant No. 11.

NEW ZEALAND

Hints for Commercial Visitors

A USEFUL little leaflet, prepared from information supplied by His Majesty's Trade Commissioner at Wellington, was published by the Department of Overseas Trade in 1931. It has just been revised (September, 1934).

The best period for a visit to New Zealand from the viewpoint of climatic conditions is from December to March. Information concerning routes from England, itinerary, etc., is given, and details concerning transport, fares, cable and telephone rates, etc.

Commercial travellers entering the Dominion are required to deposit £10 in respect of income-tax on business received during their stay. In the event of this proving more than sufficient to defray the amount due, the balance is refunded. Representatives of British companies actually signing contracts in New Zealand binding their companies at home are subject to a licence duty of 6d. for every £100, or part, of the company's nominal capital, the maximum duty payable being £150 and the minimum £10. The duty payable on samples is accepted on deposit, being refunded upon satisfactory proof of re-exportation.

Manuring for QUALITY CANNING PEAS

By HUGH NICOL
(Rothamsted Experimental Station, Harpenden, Herts.)

EXPERIMENTS IN the United States have shown recently that not only the quantity but also the quality of canning peas is to some extent under the control of the cultivator. Recent work by the Professor of Soils, F. L. Musbach, in Wisconsin—agriculturally one of the most intelligent States in the Union—has suggested that it is within the power of the farmer to influence quality of canning peas to an appreciable extent, even when given a suitable canning variety. Professor Musbach's work was reported in a recent number of this year's *Journal of the American Society of Agronomy*, and some indication of his views may be useful to canners who do not happen to have that journal within reach.

It is obviously of interest to canners to know the latest methods of securing maximum benefits in the growing of the vegetables they can, even if they do not themselves possess any arable acreage attached to the cannery. In a similar way, the beet-sugar interests have been for years at pains to encourage beet growers to grow suitable types of roots.

Professor Musbach's results relate to the three years 1930, 1931, and 1932. Each year Alaska peas were sown at the rate of about 4½ bushels an acre during the early part of May. According to the calendar, therefore, the sowings were made under the same conditions, but it will be shown that the soil moisture present at the time of sowing was sufficiently variable at corresponding dates to affect the crop very considerably.

The chief points looked for in the research were:

1. The effect of broadcasting and of drilling fertilisers.
2. The effect of varying the amount of fertiliser.
3. The effect of varying the composition of the fertiliser, particularly with reference to the influence of including artificial nitrogen in the mixture.
4. The effects of soil moisture.

The results were expressed as:

1. Yield per acre in lb.
2. Percentages of siftings (size grades).
3. Records of puncture test, Crowther tester (in 1930 only).

Fertilisers

It was found upon the type of soil used (silt loam) that under normal moisture conditions better yields were secured by drilling than by broadcasting fertilisers. Smaller rates per acre drilled, it was stated, would result in as good yields as larger quantities broadcast; sometimes even better yields could be expected. This conclusion is of course valueless unless the amounts used are stated. To give only the conclusions here, it may be said that it was found safe to drill *with the seed* from 250 to 300 lb. of 20 per cent. superphosphate and approximately the same amount (both expressed as acre rates) of a complete fertiliser relatively low in nitrogen. The proportions recommended for the complete fertiliser were 2-12-6 or 2-16-8—that is, one containing those percentages of nitrogen, phosphate, and potash respectively.

There was no advantage in applying the fertilisers to the land in advance of planting, as some have advocated. Certainly there tended to be a lower percentage germination of peas when the manure was drilled down the same spout with the seed, but the reduction in stand was compensated for by the better growth of the remaining plants. Addition of either nitrogen or potash beyond the amounts mentioned above reduced crop yield materially.

At least as far as the question of nitrogen manuring of leguminous plants is concerned, these results are in harmony with what might be expected from a consideration of Rothamsted experiments on the addition of artificial nitrogen to leguminous crops. Though relatively new field experiments have been performed on the nitrogen manuring of peas in this country, work at Rothamsted on other typical legumes has shown that they seldom benefit from the addition of large amounts of artificial nitrogenous manures if correct cultural conditions are maintained. Among those conditions, a generous supply of phosphate is necessary.

Season

The readers of this journal will, however, be more particularly interested in the modifications of quality brought about by soil and season. Professor Musbach's results were widely different in different years; the poorness of the crop—poor in amount, that is—in 1932 was attributed to a very severe infestation by pea aphis. How far that attack could be attributed to an exceptionally high soil moisture content at the time of sowing remains, for the present, an open question. The other two years were of interest in that in 1930 the soil contained at sowing time a normal supply of moisture, while in 1931 the soil was abnormally dry when the peas were

sown. The yields over the average of the fertiliser treatments were hardly significantly different for the two years 1930 and 1931, but the size grades were distributed in markedly different proportions in the two years. In both years the broadcast fertiliser (or an equivalent method of dressing using a special device that drilled the manure above the seed, in 1930), gave an appreciably higher proportion of the smaller sizes of pea than did the fertiliser drilled with the seed. Professor Musbach wrote of the 1930 results: "It is apparent that fertiliser applied with the seed served to hasten maturity".

In 1930 the smaller sizes (1's, 2's, and 3's) averaged 74·7 per cent. of the peas when fertiliser had been applied above the seed, and 71·8 per cent. when the fertiliser had been drilled with the seed. In 1931 the peas were not of such generally excellent quality; the results of sifting tests gave an average of 47·6 per cent. of the same small sizes for drilled manure, and 49·6 per cent. when the fertiliser had been broadcast. It seems as if the effect upon quality of the method of applying the fertiliser was more marked in an already good year for canning peas.

Soil Moisture

While the grower can exercise some apparent control over quality and maturity by his choice of method of applying the manures to the pea crop, it seems from Professor Musbach's work that a still more potent influence is exerted by soil moisture. It is difficult to separate the effect of soil moisture at sowing time from the general effects of season, but Professor Musbach's results suggest that pea growers should be encouraged to choose a sowing date by the moisture content of the soil rather than by consulting the calendar.

Conclusions

It is dangerous to argue from conditions in the United States and from results obtained on one type of soil to the complex conditions which prevail over here, but it may seem worth the while of canners to perform some investigations of their own upon the points raised in this article. Short of undertaking deliberate experiments upon the relationships between soil moisture at sowing time and quality in the factory, it might be worth while to accumulate data of moisture percentages of soil sampled when the peas are being sown, with results of examination of the quality of peas from the fields sampled. This would, however, be a lengthy process, and unless a very large number of soils and crops were investigated in one year, no conclusions might emerge for several seasons. Nevertheless, it seems a promising method, though the method of direct experimentation would yield additional and more rapidly acquired information. Any such experiments would naturally be planned to include observations upon the effect of weather during the whole of the growing season of the pea.

2,000 Years Ago

Beef Suet*

From Oxe, or Cowes suett also, which is of the kidnies, the skinne is to be taken off, and it must be washt in sea water taken out of ye deep, then it must be cast into a mortar & beaten cárefully, sprinckling the sea-water vpon it. When all is dissolued, it must be put into an earthen vessell, and soe much sea-water poured into it, as may stand noe less than a spanne aboue it, & it must be sod till it hath lost its owne smell. Afterward for euerie Attick pounde of ye Suett, you must cast in 4 dragms of Tyrrhenian wax. Then, hauing strained it & taken away the filth that lyes in ye bottomme, it must be put vp into a new vessell. Afterward, being couered, it is to be set abroade euery day into ye Sunne that it may growe white & cast away its ranck savour.

* From *The Greek Herbal of Dioscorides.*—(Translated into English in 1655.)

Correspondence

September 26, 1934.

To the Editor,

Sir,

COLD STORAGE AND VITAMIN POTENCY

Cold storage plays an important rôle in human dietary, by enabling perishable foods to be transported from the prolific zones of production to countries where the home supply is nil or insufficient to meet the needs of the population, and to be kept wholesome until required for consumption, thus lowering the cost of living and raising the standard of nutrition throughout the world.

The equipment of ships with cold storage, and the provision of similar facilities in our towns, has an enormous influence in increasing our inter-colonial trade in foodstuffs. There is, however, an impression among certain people that cold storage during a voyage, and perhaps subsequent storage at the port of landing, exerts detrimental effects, especially in vitamin potency, on the food. Your readers may be interested to know that such is not the case.

In the report issued by the Medical Research Council on the vitamin content of Colonial butters, it is shown that Australian butters, for example, have a remarkable stability in cold storage.

Tests proved, the report states, that there was no appreciable loss of vitamin potency during the two to three months' period of cold storage (including ocean transport) which usually elapsed between the making of the butter and its final consumption in this country, and this was true of butters produced either from sweet or acid cream. Furthermore, there was no significant loss of either vitamin A (growth-promoting and anti-infective) or vitamin D (the main factor in the prevention of rickets) in cold storage for the periods of five to ten months, and even when stored for longer periods—one to three years—the butters retained most of their original potency.

It is, I think, important that the public should be assured that the butter produced by our kinsmen overseas undergoes no appreciable deterioration either during transport or any necessary period of storage in this country.

I am, Sir,

Yours faithfully,

John Campbell, Ph.D.

Dulwich, S.E. 22.

CUCUMBER CANNING IN POLAND

By Dr. D. J. TILGNER
of Warsaw

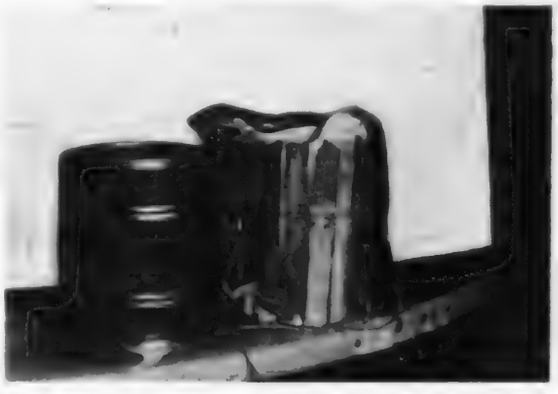
One of the most industrialised land estates in Western Poland is Pudliszki, p-ta Krobia, where 1,600 acres are devoted exclusively to the growing of canning fruits and vegetables. "In two hours from field to can" is the slogan of the establishment, and gathering of the various perishable foodstuffs is performed very expeditiously.

The illustration at the head of this article shows workers busy in one of the fields.

THE CANNING industry in Poland is of recent origin. Although a few factories existed before the World War, the main development has taken place during the last fifteen years. New plants were built, and in a short time Poland started to be self-supporting in almost every canned food line. With regard to tinplate manufacture, Poland possesses an entirely up-to-date tinplate works, which is a branch of the huge Upper-Silesian Batory concern. Being of equal quality the Polish tinplate has entirely eliminated foreign competition during the past few years. However, as one of the results of the British Trade Mission, which recently made an extensive study of Polish economic life, and due to the interest and efforts of Sir Edgar Jones, known internationally as the "Prime Minister of the English Canning Interests", English tinplate will again find a favourable access to the Polish market.

The agricultural character of the country somewhat hinders the development of the Polish canning industry and also makes the Polish market a somewhat limited one for canned foods. The large cities like Warsaw, Cracow, Poznan, Katowice, and so on, and the huge industrial centres in the south and middle-west, form the main natural outlets for canned foods.

During the last few years the attention of Polish canners has been directed through the efforts of the State Export Institute to foreign markets, especially after a few shipments of canned goods had met with success. Several items, principally canned cucumbers, were received enthusiastically and caused a rather unexpected and immediate rush towards inaugurating a large number of new canning enterprises. The produc-



The large 2-gallon cans with canned cucumbers have to be adequately protected before being packed into cases.

tion increased considerably and keen competition made prices dwindle to very low levels. But in spite of the small margin of profit, there still exists a wide interest in producing large quantities of canned cucumbers for internal as well as export markets, especially the United States and England.

Since the products of individual manufacturers showed rather pronounced differences, the State Export Institute initiated and worked out a general scheme for the production of canned cucumbers, stressing the quality and the grading of the raw product as well as the manufacturing process. The tentative rules met with general approval and are obligatory for those engaged in the export business.

Cucumbers made into pickles are chiefly classified according to the method of preparation, either by the use of salt (dill pickles) or vinegar (sweet or sour pickles). Polish canned cucumbers belong to the latter group, though their keeping quality depends upon proper sterilisation and not upon their acid content. In fact, Polish cucumbers have a very low acid content, which, together with their delicate spicing, gives them a distinctive and mild flavour and taste. In this respect the end product differs greatly from any other known variety, and conserves, besides that, the crisp succulence of the fresh material.

From the manufacturer's viewpoint the production of canned cucumbers is far less troublesome than the preparation of fermented dill pickles, since the risk of occasionally obtaining a rather large proportion of pickles of a slippery and soft nature does not exist.

Only sound and fresh cucumbers as they come from the vines should be used. Due to the fact that the cucumber is approximately 90 per cent water, it is evident that it must be handled with some dexterity in order to prevent the loss of moisture which results in a toughening of the product. Any variety giving regularly shaped and firm-fleshed fruits with a uniformly deep green colour will satisfy. The majority of packers prefers the Polish variety "Monasterskie", which is ready for picking in August and September. The length of the cucumber should not be less than $3\frac{1}{8}$ inches (8 cm.) and not more than $4\frac{3}{4}$ inches (12 cm.), with a maximum diameter of 2 inches (5 cm.). The picked stock should not be permitted to stand in a heap, as this sets up the production of heat, which is not conducive to successful canning operations.

The raw material is delivered to the factory in two sizes—namely, smalls, cucumbers measuring 8 to 10 cm. in length, and the large cucumbers 10 to 12 cm. in length. Any crooked or badly shaped cucumbers are discarded. After a very thorough cleansing process the cucumbers are ready for packing. No pricking machine, which pierces the skin of the cucumber, is used, since

Plenty of light and fresh air is the rule in any operation at the Pudliszki cannery.

The filling department of the Pudliszki establishment is only partly mechanised in order to be able to handle many different products.

experience has shown that this does not enhance the quality of the canned product, though the pricking machine plays an important rôle in any other methods of pickle manufacture.

Only lacquered cans are used, the large 2-gallon size of 8,890 c.c. capacity being the commonest. With the usual grading this can holds either 40 to 45 large or 55 to 65 small cucumbers. In the bottom of the can the packer places, according to his personal judgment, a spice mixture consisting of black pepper, dry bay leaves, dill herb, and a few other ingredients in rather small quantities. After the cans are well filled the brine is added. The low salt and acid contents form the secret of success in the case of Polish canned cucumbers.

During and after sterilisation a reduction in the acid strength takes place until an equilibrium has been established between the product and the liquor. According to the tentative rules the final concentration of the finished product should amount to not less than 0·7 per cent. The cans are sterilised for 15 to 30 minutes at various temperatures, mostly below the boiling point of water.

Neither preserving chemicals nor hardening agents are added. The chief fault is a soft product, lacking in crispness, due to overcooking or unsuitable raw material. Poor grading and an unbalanced taste or flavour due to carelessness in the mixing and addition of the spices are other points to bear in mind.

TABLE SHOWING AVERAGE MARKET SAMPLES OF POLISH CANNED CUCUMBERS BEFORE STANDARDISATION

	Cucumbers.		*Liquor.*		
Code.	*Number Per Can.*	*Maximum and Minimum Sizes in cm.*	*Degrees Balling.*	*Acidity in Percentage of Acetic Acid.*	*Remarks.*
U	45	9-13	5·0	0·25	
B	42	9-11	5·5	0·3	
A	38	10-13	6·0	0·36	
C	46	9-11	4·0	0·36	
Z	46	9-14	5·5	0·36	
O	30	7-16	5·0	0·33	Poor grading
O1	35	9-14	5·0	0·5	Too large
N	50	9-11	4·5	0·36	
K	50	9-11	5·0	0·48	
W	45	6-13	5·0	0·43	Poor grading
Pudliszki		—	7·0	1·03	
CH			3·0	0·5	Barrelled dill pickles
American	—	—	9·0	1·05	Exceedingly strong taste. American product.

Pressure in Cans

By
P. Chambellan
H. Cheftel
M. L. Thuillot
R. Boudeau

Part V*—Exhausting, Sealing and Cooling

WE HAVE seen that, in order to mitigate the stress on the can and not to subject it to an excessive strain during the sterilising process, it is advisable to seal the can while it is hot. By sealing at a high temperature permanent deformation of the ends and "flippers" and most of the leakages may be avoided—*i.e.*, the coefficient of security is greatly increased. In order to seal the cans while they are at a high temperature, use is made of exhausters; these all, without exception, comprise a conveying device which leads the cans through a steam or hot water bath. There are three principal types of exhaust—viz., the chain, disc, and rotary. Figs. 12, 13, and 14 show the construction of these, while Fig. 15 shows one of the first plants of this kind erected in France.

The cans, after filling and brining, are automatically conveyed through the apparatus and emerge therefrom after a more or less quick passage through the exhaust chamber. For most vegetables of low acidity, exhaustion of 3 to 4 minutes at 100° C. is sufficient. Use is generally made of steam apparatus for these vegetables. For acid fruit, however, where it is important to expel even the dissolved air as completely as possible, exhaustion requires from 10 to 15 minutes, and in order to spare the delicate skin of the fruit it is necessary to use hot water exhausters, the water temperature being regulated at 80° to 85° C.

After leaving the exhauster the cans are immediately sealed and pass without delay to the steriliser. It is very important to prevent them from cooling down, as otherwise the initial temperature of sterilisation would be lowered and there would be a risk of reaching a temperature favourable to the development of bacteria, which would not fail to jeopardise efficient preservation.

Exhausting does not involve a large supplementary supply of steam, because the initial rise of temperature obtained by this method allows of a proportionate reduction of the duration of the sterilising process. Moreover, the advantages presented by this method are so numerous that its adoption quickly became general in the United States and in England; it will not be long in spreading over the rest of Europe.

At this point, though it lies somewhat outside the province of our study, it will be of interest to mention two further advantages of exhaustion, both of which are important and proceed from the almost total expulsion of the oxygen of the air: these are slowing down the rate of corrosion and preservation of vitamins.

In the corrosion of tinplate, the oxygen acts as a depolarising agent; when there is no oxygen present, the difference of potential between the tin and the iron decreases rapidly and remains at a level at which the dissolution of the metal goes on only very slowly. The studies of numerous investigators have

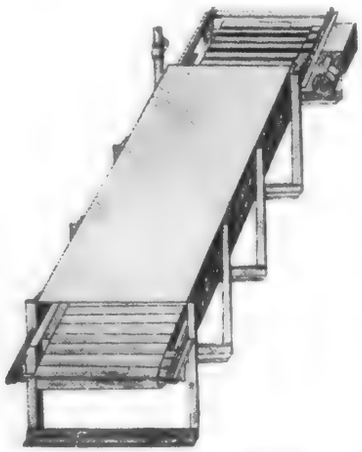


FIG. 12.—Chain Exhauster.

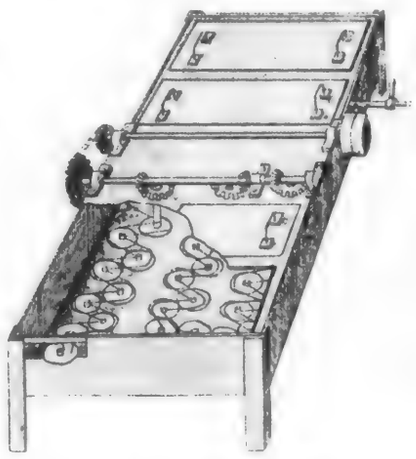


FIG. 13.—Disc Exhauster.

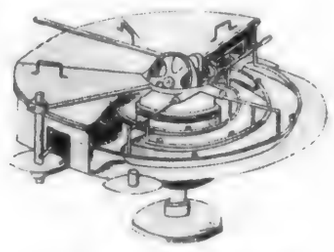


FIG. 14. -Rotary Exhauster.

* Concluded from October issue.

FIG. 15.

proved this, and works practice, going back for more than ten years, has confirmed the laboratory observations.

As for the vitamins, it has been amply demonstrated that they resist the temperatures used in the sterilising process quite well, and that those among them which appear very sensitive to heat are affected by it only if oxygen be present. This shows clearly how important it is to expel the air from the can before processing—*i.e.*, before submitting the material to a temperature capable of causing rapid oxidation of certain important compounds.

In one of our next Bulletins we propose to take up these questions in greater detail.

Vacuum Sealing

Mechanical vacuum sealing offers another means of eliminating air before sterilising. This method of sealing is very useful for certain delicate foodstuffs, but is less generally employed than the exhaustion process, chiefly because vacuum sealing requires special machines, the rather limited output of which is unsuitable for large factories.

Cooling Under Pressure

As we have pointed out (p. 294), this method is very useful when it is desired to spare the can; it is even indispensable for certain shapes of cans and for certain foodstuffs, as for instance spinach, which is sterilised at a rather high temperature. Cooling under pressure is very widespread in the United States and is beginning to be introduced in France, on account of its simplicity and of the security it gives to the process.

Preferably, the cold water is let in at the base of the retort. This ingress of water brings about condensation of steam, accompanied by a notable fall of the pressure in the retort; now it is precisely this fall of pressure that must be avoided, as otherwise the results obtained would be quite opposed to those aimed at—that is to say, the cans would burst for lack of an outward counter-pressure. Therefore, in order to keep the retort pressure at the level reached, steam or compressed air is introduced, by means of a regulator, at the same time as the water. In this way, the cans are cooled at the same pressure at which they have been sterilised. When their temperature has been lowered to such a point that there is no danger, the pressure of the autoclave is released and the cans are taken out. Eventually the cooling can be continued in an open tank.

Cooling under pressure by means of compressed air is more rational, and can be carried out entirely automatically, but it requires more complicated plant than pressure cooling by means of steam. Therefore we shall describe in detail only this latter system. The principle of the method is as follows:

When the sterilising process is concluded, steam is sent into the upper part of the retort through a special external pipe, while at the same time the entry of steam at the lower part of the retort is stopped.

Cold water is then introduced into the lower part of the retort at a pressure exceeding that of the steam. This cold water rises progressively in the retort, while the pressure is kept nearly constant by the introduction of steam at the upper part.

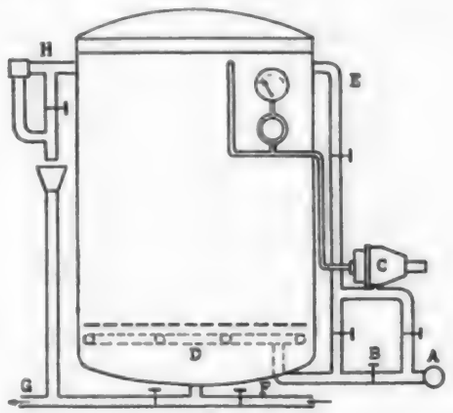


FIG. 16.—A, steam mains; B, direct inlet of steam; C, regulator; D, worm; E, steam inlet at the upper part of the autoclave; F, inlet of water under pressure; G, water drain; H, water overflow.

But in order to prevent this steam, required to uphold the pressure, from undergoing condensation when brought into contact with the cold water, it is necessary to maintain over this latter a layer of hot water acting as a screen. To this effect, it is sufficient to introduce the cold water in such a manner as to avoid the formation of eddies; the hot water layer which is at the bottom of the retort under the grating thus remains uppermost on account of its lesser density and acts as a screen. The formation of eddies is prevented by placing a perforated sheet-iron plate just above the cold water inlet (Fig. 16.)

Fig. 17 shows details of the arrangement, and Fig. 18 illustrates one of the first plants of this type erected in France.

We cannot conclude this brief account of the method of cooling under pressure without mentioning that it is thanks to this method that it has been possible

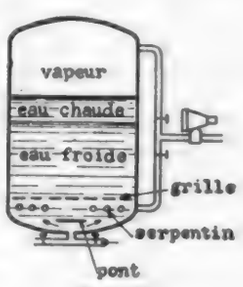


FIG. 17.

to build the modern continuous large output pressure cookers now in use in numerous American and English canneries. The principle of the continuous retort is very simple: the can enters at one of the ends through a rotary valve and goes out at the opposite end through another similar valve, after having been carried along by a helical guide and a rotating drum; the velocity of rotation of this latter, as well as the dimensions of the retort, determine the time during which the can remains in the apparatus. But it is clear that it would be impossible to pass 150 cans per minute through the retort without introducing all the disadvantages due to a too rapid release of pressure. In order to obviate this inconvenience, the continuous pressure cookers are always coupled to a continuous cooler, through the intermediary of a rotary valve; thus it is only after they have been cooled down sufficiently that the cans pass into the open air.

A possible drawback of this method of cooling under pressure lies in the fact that the cans run the risk of collapsing if the process of cooling is pushed too far; it ought to be possible gradually to lessen the outward pressure whilst the cans are being cooled. An elegant solution of this problem is now applied by the Food Machinery Corporation in its latest pattern of continuous vertical pressure cooker with hydrostatic pressure cooling (Fig. 19).

The retort consists of a vertical watertight cylinder into which steam is sent through a regulator. At the upper end a rotary valve admits the cans; they are caught in the rectilinear guide of a continuously revolving central drum. On the inner side of the autoclave is a hoop iron helical guide; the cans, thus caught between the drum and the helical guide, go down spirally around the axis of the machine. Once down, they are picked up by a second rotary valve, which conveys them to the cooler.

This latter apparatus also comprises a vertical cylinder provided with a helical guide and a revolving drum with rectilinear guides, but it is open at its upper end and has

FIG. 18.

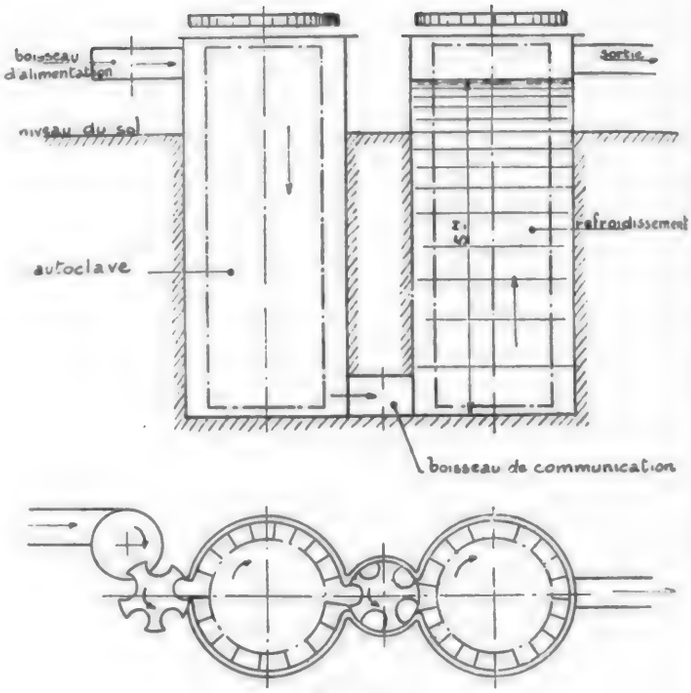


FIG. 19.

no special device for maintaining the pressure inside it. The cylinder is filled with running cold water and it is this water column itself which exerts its pressure upon the cans. These latter enter the apparatus at its lower end, and as the plant is more than 5 m. high the cans are subjected to an outward pressure of about 55 gm. on leaving the autoclave. Once introduced into the cooler the cans rise slowly, and as their temperature decreases the height of the water column above them decreases also. When they come out of the water at the upper end of the apparatus they are completely cooled.

The various considerations discussed in the preceding pages once more prove how complicated in reality is the problem, apparently so simple, of putting a foodstuff into a tinplate can and ensuring its preservation.

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CANNING OYSTERS

By J. P. TULLY
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CONSIDERABLE QUANTITIES of Pacific (Japanese) oysters are now being placed on the market in the canned form and the demand for the product appears to be increasing. While some oystermen sell to a neighbouring cannery, there is some hesitancy in following this practice in view of the fact that the grower loses not only the shells, but also the spat adhering to them. Even where the shells might be returned, the spat is killed by the steam used to open the shells.

Some studies were made at this station to determine a method of canning that could be used by the local growers who wished to open the oysters cold. The resulting process has been found to give an excellent pack, exhibiting all the desirable qualities found in those canned by other methods.

Preliminary Treatment

In order that the canned product may have as pleasing an appearance as possible, it is essential that the oysters be clean inside as well as out. This is best accomplished by placing the freshly gathered oysters in a single layer on a sink-float. This consists of a platform submerged from one to two feet below the surface and should be so situated that sea water, of approximately the same density as that in which the oysters were reared, may circulate freely over it. On such a sink-float the oysters will cleanse themselves thoroughly in two or three days. It is important to note that the oysters should not be stacked on the float, as this will prevent the flushing action.

Opening and Cleaning

Any suitable method of opening the oysters may be used. However, it is important that there be no cuts in the meat and that no dirt be introduced during the process.

Immediately on shucking the oysters should be dropped into a cold 1·5 to 2 per cent. brine (1½ lb. salt per 10 gallons of water; salometer reading 7·5 to 10). Filtered sea water may be used in place of the brine if the salinity is suitable. Some further cleaning may be necessary and the oysters should be rinsed in a series of brines (three or four) until there is no evidence of dirt being shed after they have stood for five minutes. The canning process should commence as soon as possible after the oysters are opened.

Preliminary Cooking

A sufficient number of oysters to make one run in the retort is just covered with brine in a double boiler with a close-fitting lid and heated for forty-five to sixty minutes until a temperature of 160° F. is reached. In order that the heating may be uniform it is necessary to stir occasionally with a wooden paddle.

The nectar should assume a blue-grey opalescent colour and be semi-transparent, though if the oysters have not been thoroughly cleansed this may have a purplish tinge. Any solid dirt that comes out of the oysters during the cooking will settle to the bottom of the pot and may be eliminated when the liquor is decanted later. Oysters preheated in the manner described are cooked more uniformly and the nectar is clearer and more appetising than if the oysters are preheated in the cans.

Filling the Cans

During the preheating process the cans should be rinsed in clean, fresh, hot water, and then stacked upside down until required.

The oysters should be laid into the cans so that they come within ½ inch of the top, and enough hot nectar, from which the dirt has been removed, is added to fill the cans within ⅛ inch of the top. Crowding the meats may cause unsightly stains to appear. The lids are then laid on loosely and the full cans set into the steam chest for a period of fifteen minutes to half an hour. This raises the nectar nearly to the boiling point, expels the air from the cans, and ensures a vacuum.

The cans are then removed from the steam chest one at a time, sealed immediately, and placed in the retort. Care must be taken that the lids are not knocked off the cans during this procedure.

Retort Cooking

Pressure cooking sterilises the contents of the can and finishes the cooking process. For the former purpose it is necessary to raise the entire contents of the can to at least 240° F. The time for which this temperature should be held is governed by the amount of cooking necessary and the size of the can. The following table represents the best relation between time and temperature in the retort for three different sizes of cans:

Can size.	*Pressure.*	*Temperature.*	*Time.*
1 lb. tall	12 lb.	240° F.	45 minutes
1 lb. flat	12 lb.	240° F.	45 minutes
½ lb. flat	12 lb.	240° F.	25 minutes

These times and pressures may be varied within narrow limits, but those indicated have been found to give the best results in tests, and it is believed that they are the most economical relations that will produce a satisfactory product.

The time required to raise the pressure in the retort must be standardised at some period between fifteen and twenty minutes, and must not vary from the time chosen by more than two minutes on any run. The time in the retort is measured from the moment that the desired pressure has been attained. Careful attention to the measurement of the time taken in each step of the process will ensure uniformity of cooking throughout the pack.

When the cooking is finished the first 5 lb. pressure should be blown off slowly, and when the pressure has dropped to 7 lb. the remainder of the steam may be blown off as quickly as desired. The initial slow release of pressure prevents the pulping of the meat and the formation of gas cells (honeycombing in the meat).

Cooling

The cans are removed from the retort at once and inspected for hot leaks, and any can that is leaking should be rejected. They are then passed into a hot lye bath containing ¼ lb. of lye per gallon of water, quickly brushed over, and immediately washed down with a stream of cold fresh water in a tank or with a hose, the latter method being preferable.

The cans when washed should be set in a dry place to cool and dry. They should be cooled to a temperature of 100° F. in less than twelve hours, otherwise crystals of sodium magnesium phosphate ("glass") may form in the cans. During the cooling the ends of the cans should collapse with a snapping noise. This collapsing is an indication of a proper vacuum and should take place before the cans have cooled to 100° F., or should occur at this temperature upon the ends being touched lightly with the finger. If the ends of the cans do not collapse until cold, it does not necessarily mean that the contents are spoiled; such cans may have been over-filled or may have been too cool when sealed. They will bulge, however, in warm weather or at high altitudes and are, therefore, unsaleable and must be rejected.

Storage

The cans may be lacquered and labelled before storing. The place of storage should be dry, airy, and cool, and each retort run making up the pack should be segregated, so that after testing any faulty run may be eliminated from the stock.

Testing the Stock

It is recommended that at least 10 per cent. of the cans from each of the first ten runs should be stored separately at a temperature of 80° to 90° F. for at least two weeks, then opened and graded. After the operator is assured that a satisfactory processing technique has been established it is necessary to check only one or two cans from each run through the retort.

The British Edible Oyster, *Ostrea edulis*. (After J. H. Orton.)

In grading, a vacuum should be apparent either by the hissing intake of the air when the can is punctured with a nail, or by measurement on a vacuum gauge. At normal temperatures at sea level the vacuum should be at least eight inches. The nectar should be semi-transparent with a light blue opalescent colour. The odour should be faint and attractive and the flavour sweet and very slightly salt. The meat should be natural colour, without stains, firm, whole, invitingly crinkled along the edge of the mantle, and of uniform size.

In order to gain a quality pack the oysters must be the finest, correctly graded, and thoroughly cleaned. The time of preheating, raising the pressure in the retort, and the pressure cooking must be standardised and kept constant within two minutes, and the time of cooling must be constant to within one hour.

Canned oysters are a fancy product, and are necessarily processed for an epicurean trade. Therefore, each package should contain nothing but the finest grade of materials, properly cooked and presenting an appetising appearance. It is essential that the small canner put up a quality pack in order to gain and hold a market.

Acknowledgment.—The above information is taken from Report No. 19 (April, 1934) of the Pacific Biological Station and the Fisheries Experimental Station (Pacific), both of British Columbia, under the direction of the Biological Board of Canada.

Industrial News

EMULSION TECHNIQUE—I.C.I. AT BREWERS' EXHIBITION—AT THE CHEMISTS' EXHIBITION—"CELLOPHANE" DEVELOPMENTS—"TRANSPORT EFFICIENCY"—FRUIT WINES AND CORDIALS—SOYA FOODSTUFFS—ELECTRIC VIBRATING FEEDERS—FRUIT SUPPLIES IN 1933

Emulsion Technique

A Symposium on "Technical Aspects of Emulsions", organised by the International Society of Leather Trades' Chemists, will be held at the Royal Society of Arts, John Street, Adelphi, W.C. 2, on Friday, December 7, from 10 a.m. to 6 p.m. The Chairman will be Professor F. G. Donnan.

Among the large number of very well-known speakers will be Dr. W. Clayton ("The Study of Emulsions in the Patent Literature"), Dr. J. W. Corran ("**A Few Emulsification Problems Related to the Food Industry**"), Mr. R. I. Johnson ("Types and Performances of Emulsifying Machinery"), Prof. H. Freundlich ("On the Mechanism of Emulsification"), Dr. L. A. Jordan ("The Stability of Emulsions in Thin Films"), etc.

All those interested in the subject of the symposium are cordially invited to attend this meeting and to participate in it. At the meeting the papers will be briefly summarised and the subjects then thrown open for discussion.

In the evening at 7.30 a dinner will be held at Maison Lyons, Shaftesbury Avenue. The charge for this will be 6s. 6d. exclusive of wines (morning dress).

The meeting is attracting considerable attention, and everything points to its being a most successful function.

The proceedings will subsequently be published in bound monograph form at a cost of about 5s. 6d.

▼ ▼ ▼

I.C.I. at Brewers' Exhibition

"Lustros" and "Chloros" will be shown on the I.C.I. stand at the Brewers' Exhibition to be held from November 3-9 at the Royal Agricultural Hall. The first is much used as a detergent, germicide, and water-softener; the second is a sterilising agent for general use.

Copper materials for the brewing industry will also be shown.

▼ ▼ ▼

At the Chemists' Exhibition

The Corn Products Co., Ltd., of Bush House, Aldwych, London, were showing their "Dextrosol" brand dextrose and liquid glucose at the Chemists' Exhibition recently held in the New Hall of the Royal Horticultural Society at Westminster, as well as "Karo" syrup, a food for infants and children. This is composed of dextrin, dextrose, malto-dextrin, maltose, and sucrose. Complete digestion of this food is claimed to be within the digestive capacity of even the most delicate child.

On the stand of Messrs. William Gardner and Sons (Gloucester), Ltd., we saw cake mixers and cream whisks, and were very interested in their hand emulsifier. This was primarily designed to reincorporate butter and milk with the production of reconstituted cream, which it does very well, the product being practically indistinguishable from the genuine article. However, it should be capable of application to the production of a large number of other emulsions, and anyone interested should apply to this firm for further particulars.

Cardboard boxes of all kinds were displayed by Messrs. Robinson and Sons, Ltd., of Chesterfield. Cartons and showcards are manufactured by this firm, and sketches and designs are prepared by artists in their own studios.

World Tour

Mr. J. W. Tangye, Assistant Managing Director of Messrs. Tangyes, Ltd., Engineers, of Birmingham, has just started out on a business tour of the whole world. Proceeding first across Europe to the Near East, he will later travel to the Far East, and after calling at New Zealand he will go on to South America and other parts. It is expected that the tour will occupy a period of about fifteen months.

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"Cellophane" Developments

Courtaulds, Ltd., are to set up a factory in England for the production of transparent paper under the trade marks "Cellophane" and "Viscacelle". Their directors announce that they have recently come to an arrangement with La Cellophane of France, and its allied companies, to this end.

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The Stenhouse Williams Library; a Welsh contingent at the opening of the Memorial Library at the Shinfield Dairy Research Station. Left to right: Dr. T. G. S. Jones, Mr. R. H. Morgan, Dr. W. L. Davies and Mr. L. Lawes.

"Transport Efficiency"

This is the title of a new monthly magazine, for goods vehicle operators only, published by Morris Commercial Cars, Ltd., of Birmingham, the first number of which appeared last month.

The object behind this magazine is to assist goods vehicle users—not merely users of Morris-Commercials—to obtain maximum efficiency from their vehicles and to keep them informed on current legal problems.

Amongst the features of the first issue, a copy of which can now be obtained from any Morris-Commercial distributor or dealer, is a simplified record form which meets the requirements of the record regulations and at the same time dispels any possibility of confusion or the risk of a vehicle owner using the wrong form.

Transport Efficiency claims not to attempt to compete with established trade journals, but to have set a new fashion in technical journalism by restricting its scope to goods vehicle operation, and presenting nothing that is not of direct interest to those who strive after transport efficiency and who, after all, are already well served on more general matters by existing publications.

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Lord Nuffield, speaking at the luncheon given to the National Council of the Road Haulage Association, paid high tribute to commercial vehicle drivers for their consideration of other road users. Touching on the question of road safety, Lord Nuffield said that he had concentrated upon incorporating safety features in the Morris-Commercial vehicles.

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Canning Peaches. Cans enter and leave the Drainer automatically; as it revolves they are completely inverted, so that any surplus water is drained out, thus ensuring that the syrup will not be diluted (*see* article on page 396).

Fruit Wines and Cordials

These form the subject-matter of a very useful little leaflet recently published by Messrs. A. Boake, Roberts and Co., Ltd., the well-known essence distillers, of Stratford, London.

The object of these notes, as stated by the publishers, is to enable the mineral water manufacturer to obtain the best results in the preparation of fruit wines and cordials employing their concentrated fruit or concentrated compounded essences.

It is emphasised that fruit wines and cordials should be made up in advance of requirements; they are always the better for having been stored some little time before being consumed. The preparation of the syrup for the fruit wines is described and recipes for the following fruit wines containing it are given: black currant, blackberry, cherry, cowslip, elderberry, ginger, orange, raisin, raspberry, red currant, sarsaparilla, and strawberry.

A different syrup is used for cordials; its preparation is described in detail, and recipes for the following cordials are set out: aniseed, black currant, caraway, cherry, clove, gingerette, lemon, cloudy lemon squash, lime juice, lime, lovage, noyeau, cloudy orange, peppermint, pineapple, raspberry, sarsaparilla, strawberry, and vanilla.

Recipes are also given for lemon, orange, lime, and grape crush cordials, and, finally, on the inside covers of this interesting leaflet, are formulæ and full working instructions for making ginger wine and ginger beer from "Tonginger" Extract.

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Change of Address

The Pneumatic Scale Corporation, Ltd., have moved to Whitehall House, 41, Whitehall, S.W. 1. Their telephone number (Whitehall 7411) and telegraphic address (Doblematic, Parl, London) remain unchanged.

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Mr. T. Crosbie-Walsh, F.I.C., F.C.S., will be at Messrs. Arthur Holden's stand during the period of the Canners' Exhibition at Leicester.

F.I.B. Refrigeration Research

Important work in connection with insulated containers for solid CO_2, convection in narrow spaces, heat transfer between metal pipes and an air stream, evaporation from wet surfaces, the viscosity of refrigerating liquids, and plant corrosion is reported by the Food Investigation Board in their annual report for 1933. This work was carried out under the direction of the Engineering Committee at the National Physical Laboratory.

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Soya Foodstuffs

Soya beans grown on the Fordson Estate at Boreham, Essex, and foodstuffs prepared from them, were shown on the Fordson Estates stand at the Ford Motor Exhibition at the Royal Albert Hall.

Very little is known as yet about the soya bean in this country. It is grown for hay and seed; from the seed a valuable oil is obtained. The plant may be grown as an improver of the soil for succeeding crops, or as a green manure to restore the fertility of poor soils. It has been grown in the East for thousands of years, and in Manchuria, China, and Japan forms one of the staple foods of the population. Enormous quantities are imported yearly by European countries. In 1932, for instance, Great Britain imported 159,000 tons, while Germany's tonnage was well over a million.

Various attempts to grow soya beans in this country have been made in the past, but without much success; the plant needed to be acclimatised. Within the last ten years this important feat has been accomplished by Mr. J. L. North, late Curator of the Royal Botanical Gardens, Regents Park, and the four varieties shown are capable of being grown and brought to maturity successfully in England.

Soon after the war, American agriculturalists began to realise the importance of the soya bean grown as a crop for forage, and as a source of vegetable oil for industrial purposes. Determined efforts were made to grow the plant, and reports for 1933 stated that 5,000,000 acres were under soya bean cultivation in that year. Having regard to this very successful result of America's effort with soya, Mr. Henry Ford suggested that part of his estate at Boreham, Essex, should be used for the same purpose. After two years' experiments with different kinds of seed, considerable success was obtained with Mr. North's varieties, and, in September, 1934, several tons of seed acclimatised to English weather conditions were harvested successfully.

Electric Vibrating Feeders

We are informed by Messrs. Thomas Locker and Co., Ltd., Warrington, England, that the demand for their "Locker-Trayco" equipment is growing very rapidly, and recently they have supplied conveyors and feeders for such diversified products as coal and peas, granite, beans, sugar, clay, sand and gravel, flour, ores, filter cake, foodstuffs, limestone, and confectionery.

These machines ensure a strictly controlled flow of material from zero to the maximum output, they are electrically operated, and are entirely free from friction parts, dispensing with oil and grease; power consumption is negligible and installation simple.

Feeders are made in sizes ranging from the No. 1 type capable of handling up to 2,000 lb. per hour to the No. 6 type, which will take up to 1,000 tons per hour. All types can be made with open trough or tubular for dusty and poisonous materials, and special duties incorporating cooling and drying can be accomplished by jacketed tube with water or air circulation.

The firm's technical representatives are prepared to demonstrate a model feeder anywhere in the country, on customer's own product, without obligation, or customers are invited to visit the works at Warrington and make capacity tests on the larger power feeders.

We suggest that anyone interested in packing, feeding, conveying, or screening should get into touch with T. Locker and Co., Ltd., and take advantage of their offer of free demonstration.

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New Bush List

The new price list just published by Messrs. W. J. Bush and Co., Ltd., of Hackney, London, "For confectioners, aerated water manufacturers, bakers, wine merchants, and liqueurists" defies detailed review. It runs to 60 quarto pages, and the index alone comprises nearly 150 references.

Colours for confectionery and for every kind of beverage, essences for ices and cordials, essential oils (concentrated, terpeneless, and sesquiterpeneless), flavourings of all sorts, fruit extracts, syrups, etc., are all included.

Under "Sundries" will be found "Beurrine", a vegetable substitute for butter, finings for ales, wines, etc., a cream powder for the production of light centres and marshmallows, a nougat powder, varnishes for confectionery . . . but we must stop, or we shall rapidly fill the remainder of this page. All interested should send for the list.

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Machinery Test Station

The S.O.S. Patents Co., Ltd., inform us that they are opening a Northern Office at Atlas Works, Chapel Street, Levenshulme, Manchester, where a test station is being set up to demonstrate the "Pascall" Patent Turbine Sifter, "Reddrop-Periflo" Grinding Mill, "Turbine" High Speed Wet Mixer, and "Burn-Cramic" Positive Displacement Rotary Pump.

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Fruit Supplies in 1933

The Imperial Economic Committee's Weekly Fruit Intelligence Notes are issued on Wednesday in each week. They are compiled primarily for the benefit of growers and traders in the United Kingdom and in Empire countries overseas, and give the fullest possible information regarding prospective supplies of fruit. Regular articles include information as to fruit shipments afloat, imports week by week into each of the chief ports in Great Britain, and reports on the condition of fruit and vegetable crops in different countries. In addition, special articles deal with various aspects of fruit and vegetable production, consumption, and trade in all important areas.

A supplement to these weekly notes has now been prepared covering fruit supplies for the year 1933, and including vegetables.

The contents consist of sections on Sterling Exchange and Import Duties, Fruit Production in the U.K., The Production of Crops under Glass in Great Britain, Imports of Raw Fruit, Empire Fruit Imports, Fruit Consumption in the U.K., Imports of Apples, Apricots, Bananas, Cherries, Currants, Gooseberries, Grapefruit, Grapes, Lemons, Limes, Oranges, Peaches, Pears, Pineapples, Plums, Strawberries, Unclassified Fruits and Fruit Pulp. Also Imports of Onions, Potatoes, Tomatoes, and Miscellaneous Fresh Vegetables.

Further sections are devoted to The Canadian Fruit Season, 1932-1933, The North American Apple Season, 1932-1933, The South African Deciduous Fruit Season, 1932-1933, The Australian and New Zealand Deciduous Fruit Season, 1933, The Summer Orange Season, 1933, The Palestine Citrus Fruit Season, 1932-1933, The Spanish Orange Season, 1932-1933, and Imports of Fruit into the Irish Free State, into Germany, France, Scandinavian Countries, and into the U.S.A.

As regards fruit production in the U.K., there was an increase in the commercial acreage under fruit in 1933 compared with the previous year. In England and Wales the area under orchard fruit rose from 247,000 to 250,000 acres, while the area under small fruit increased slightly to a total of 60,000 acres. Production in 1933 was on the whole good. In England and Wales orchard fruits gave heavier yields than in the two previous seasons, although the crop of strawberries was lighter.

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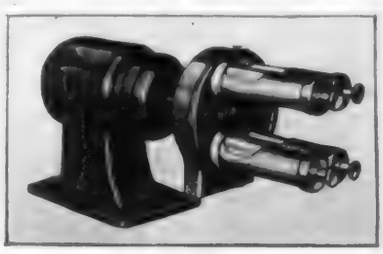
Potato Crisps

The Peerless Electrical Manufacturing Co., Ltd., have sent us an interesting leaflet dealing with their potato crisper, and another describing, with numerous illustrations, their potato peeler.

In regard to the latter, experiments are about to be carried out whereby it is hoped to convert the machine into a dual-purpose plant capable of functioning also as a hydro-extractor for drying the crisps.

Lubrication of the potato crisper is automatic and ball bearings are used throughout. The crisping mechanism is detachable from the power unit and can be taken to pieces for cleaning purposes in a matter of seconds. Any desired thickness of crisp can be obtained.



The Potato Crisper.

INFORMATION and ADVICE

Food Exhibitions—Sardine Canning—Continental Sausage—Colour of Sausage—Oxtail Soup—Sauce Manufacture—Mayonnaise Manufacture—Mayonnaise—Cocktail Cherries—Cream Caramels—Pale Chocolate—Artificial Cream—Chocolate Compound—Syrup—Sugar Loaves—Lactalbumin

Food Exhibitions

1,685. *Kindly let us have a list of Food Exhibitions.* (I.O.M.)

1934

Fourteenth Annual Imperial Fruit Show and Canners' Exhibition, Leicester, Granby Halls, November 2-10.—Apply to Secretary, Imperial Fruit Show, Limited, 5, Bloomsbury Square, W.C. 1.

International Brewers' and Allied Trades' Exhibitions, London, Royal Agricultural Hall, Islington, N. 1, November 3-9.—Apply to the Trades Markets and Exhibitions, Limited, 11, Queen Victoria Street, London, E.C.

Ninth Ideal Home, Food, and Fashion Exhibition, Edinburgh, November 3-17. Apply to the British Towns Exhibition Association, 8 and 9, Waverley Market, Edinburgh.

1935

Daily Dispatch National Food and Beverage Exhibition, Manchester, February 5-16. Apply to Provincial Exhibitions, Limited, City Hall, Deansgate, Manchester.

Agricultural Horticultural Exhibition, Amsterdam, September 14-23. Apply to Ingenieur E. de Kruijff, Kantoor Directie van het Marktwezan, Van Reigersbergenstraat, 2, Amsterdam.

Eleventh International Exhibition of Foodstuffs and Food Preparing Apparatus and Machinery (Salon de L'Alimentation), Brussels, Palais du Cinquantenaire, September 22 to October 7. Apply to Department of Overseas Trade (Exhibitions and Fairs Divisions), 2, Queen Anne's Gate Buildings, Dartmouth Street, S.W. 1; or 8-10, Place de Brouckere, Brussels.

Second Annual National Wine and Liquor Show, New York, September 24-28. Apply to Convention and Exposition Headquarters, National Wholesale Liquor Dealers' Association, Inc., Waldorf Astoria Hotel, New York City, New York, U.S.A.

Sardine Canning

1,686. *I should be glad if you would send me some details of the methods used for canning sardines and also references to literature on the subject.* (Port Said.)

Full instructions were supplied.

1,687. *I am making enquiries as regards roast whole chickens for canning, and would be glad if you could give me any information about it and about the Ashby process of canning, whether it is possible to can under this process or any other method.* (Lancashire.)

A source of information was suggested.

1,688. *Please supply information concerning chicken breast in aspic jelly: how to prepare the jelly; how to sterilise; temperature to use; how to sterilise glass moulds; how to preserve potted meats.* (Bristol.)

As a first step, we would suggest that you read the articles given in the meat and canning sections of the *Food Industries Manual*, and also the articles which have appeared in FOOD MANUFACTURE. It is obviously impossible for us to give all the information which is included in the many articles on this wide subject in these columns.

1,689. *As subscribers of your magazine,* FOOD MANUFACTURE, *we should be obliged if you could give us any information regarding the use of preservatives in meat pies, of the Melton Mowbray and mutton types.*

The points we wish to know about are as follows: Are preservatives permitted under the present regulations? If so, what are the permitted ones and the permitted amounts? Please send names and addresses of any firms supplying these. (Glasgow.)

Information was supplied.

1,690. *We should be obliged if you could let us know how to retain the gloss on potted meats. The ham and beef are boiled together and well minced. Then out into dishes to weigh about 3 lb. On exposure, the gloss goes off in about six hours. We should also like to have a safe preservative.* (Manchester.)

Information was supplied.

Continental Sausage

1,691. *Reverting to the article in* FOOD MANUFACTURE *by Peter Salomon on the manufacture of Continental sausages, we observe in the August issue that it is recommended that cooked sausages be first cooked before being treated in the smoke stove.*

As this is directly contrary to the recommendations in most standard works, where it is suggested that cooking invariably follows the smoking process, it would be interesting to know the reason for the reversal of process, as we cannot doubt that if the Continental method was a superior one, it would certainly be followed in U.S. and other countries. (Manchester.)

To this the author replies that liver sausages are always cooked first, this avoiding the danger of souring. With regard to blood sausages, these are usually not smoked at all. In the case of meat sausages, both methods are in use.

Colour of Sausage

1,692. *The object I have in view is to make a beef sausage which will retain its colour and fresh appearance for, say, 24 hours or more, when exposed during warm and bright weather. This, I know, is asking much; but samples of so-called beef chipalata have come to my notice which certainly stand up to such conditions, and it is this remarkable capacity for keeping their colour which sells them.*

In view of this, and knowing the tendency of beef sausage to darken quickly, I have wondered if there could be some extraordinary method employed. (England.)

To give an opinion on this subject is rather difficult, unless detailed procedure is known. We have heard of three somewhat similar cases during the warm spell and by checking over the general operations in one case we came to the conclusion that the high atmospheric temperature prevailing, in conjunction with the fact that bread with too high a moisture content was being used, and also that storage in the factory (not under refrigeration) for some hours prior to use was being practised, each contributed its quota of damage. In this case we suggested the following alterations: (*a*) Meat boned out and placed in store at 38° to 40° F. until actually required; (*b*) bread substituted by rusk; (*c*) a small quantity of colouring matter (this must comply with Health Regulations); (*d*) best grade skins to be used (skins are dear at the moment); (*e*) cooling immediately after filling and linking (before pounding into sixes if this is the custom). A certain amount of sweating is unavoidable at this time of the year, as the dew point is usually above 40° F. It therefore greatly assists retention of colour and appearance if the storage temperature is in the neighbourhood of this figure. Many manufacturers appear to favour lower temperatures, but the appearance of the sausage suffers on exposure to the air.

1,693. *Please let me know if the Foodstuffs Act, or any other Act of Parliament prohibits the use of carbonate of iron for colouring fish paste, if not, what proportion is one allowed to use?*

Can you tell me what to add to fish paste (100 *per cent.*) *to make it softer and smooth for spreading, also the method by which jars of this are sterilised by heat?* (Great Yarmouth.)

You would be running into trouble if you added carbonate of iron to fish pastes. We cannot understand why you should do this, as nowadays there are so many excellent food colours available.

As regards the smoothness of fish pastes, this is really a matter which depends on the proportion of fat to other ingredients, and also on the extent of mixing. The subject of meat and fish pastes was fully discussed in the March 23 issue of our associated journal, *The Food Industries Weekly*.

1,694. *I shall be pleased if you can supply me with a recipe and full details of the proper method of manufacture of the bread-crumbs used by fishmongers as a fish dressing, and also the binder used by butchers as a sausage filling to be mixed with the meat.* (Edinburgh.)

Information was supplied.

Oxtail Soup

1,695. *We have produced a soup with the general appearance and flavour of oxtail soup, but if it contains no oxtail could you tell us if it is within the law to sell it as "Oxtail soup". It seems to us that the description "Oxtail" as applied to soup has already lost its original meaning, but we do not know if this is the case.* (England.)

It would be interesting to know how many powdered "oxtail" soups on the market do contain oxtail meat. However, it is generally agreed that both this and the canned soup should at least possess the flavour of oxtail. One would imagine that, theoretically, it is illegal to sell any kind of soup as oxtail unless it contains some of the constituents derived from oxtail. It is difficult to forecast the reaction of a food inspector who, in visiting a factory making "oxtail soup", fails to discover any signs of oxtail anywhere. He might be pacified if one could show him that one was using a genuine meat extract.

Sauce Manufacture

1,696. *Would it be economically possible for us to engage in the manufacture of sauces or other bottled stuff? We have no previous experience in these lines.* (England.)

Yes, provided you charter a man who knows how to make sauces and whatever else you wish to make.

Mayonnaise Manufacture

1,697. *We are interested in the manufacture of mayonnaise, and would be glad to have particulars of the methods of manufacture.* (Switzerland.)

The enquirer was referred to an article we published in the May, 1933, issue.

Mayonnaise

1,698. *We manufacture real mayonnaise out of fresh eggs and arachis oil and nothing else. We intend to make it in such a way that it will keep good, and we should be obliged if you would inform us which preservatives we are allowed to add to conform to British regulations.* (Denmark.)

According to British law, it is not permitted to add any preservative to mayonnaise. If your formula is correct and you prepare it in the correct way so as to obtain a stable emulsion, and your oil does not contain free acid, there should be no difficulty in keeping it in a fresh condition. You must be careful to avoid beating air into the mayonnaise and to prepare it under perfectly hygienic conditions. Also, all utensils must be quite dry. The vinegar, mustard, and salt will act as preservatives.

Cocktail Cherries

1,699. *Cocktail cherries tend to go mouldy after they have been opened. What preservative should be used?* (England.)

The cherries and syrup altogether should receive three good boils, one every other day. It is fatal to rush the process, otherwise they will not keep. Please refer to our articles on methods of preparation.

We are indebted to Messrs. A. Boake, Roberts and Co., Ltd., for their views on this point:

". . . As far as we know, no preservative is allowed at all in cocktail cherries. In preserved cherries, sulphur dioxide is permitted to the extent of 3,000 parts per million, and in order to cover residual quantities of SO_2 after processing, the Statutory Regulations permit of an amount not exceeding 100 parts sulphur dioxide in glacé cherries under the classification, "Crystallised, Glacé or Cured Fruits, including Candied Peels." As you are undoubtedly aware, when the cherries are imported into this country they are preserved in SO_2 solution, and the bulk of the sulphur dioxide is removed in processing. From long series of analyses which we have made we have found that the SO_2 content in glacé cherries, at any rate, is in the region of about 50 to 75 parts per million, and the residual SO_2 combined with the processing and syruping of the cherries is sufficient to prevent formation of any mould. Cocktail cherries are, of course, not so heavily syruped as the glacé cherries, but we ourselves have never had any complaint of mouldiness in preserved cherries."

1,700. *Please supply information concerning the manufacture of jams, jelly, butter and cheese, ale, beer, stout, and wines; also machinery required.* (Demerara.)

Some general advice was given. These questions cover such a wide field that it is impossible to give detailed information in these columns.

1,701. *I have started a factory for jam, confectionery, etc., and shall be grateful if you will be so kind as to advise me on one or two points which are causing me some difficulty.*

The first is the prevention of mildewing (details were supplied by our correspondent). What methods can be used for regulating the consistency of honey, and avoiding crystallisation? Is there any way of lightening the colour? (N.E. Rhodesia.)

Assistance was given on these and other points raised in our correspondent's letter.

Cream Caramels

1,702. *Do you know of a formula for the manufacture of cream caramels?* (Brussels.)

The following two formulæ for cream caramels have been taken from Scarborough's book—*Sweet Manufacture*:

White sugar	27 lb.
Glucose	27 ,,
Full cream sweetened condensed milk	26½ ,,
Hardened coconut oil	12½ ,,
Butter	7 ,,
Salt	2 oz.
Vanillin crystals	3 drm.

Melt carefully and boil quickly to about 250° F., stirring well. Add vanillin at the latest possible moment. Caramel should be a very light colour with a soft bite. Cut and wrap without delay.

Brown sugar (pieces)	23 lb.
Glucose	23 ,,
Full cream sweetened condensed milk	20 ,,
Hardened coconut oil	20 ,,
Cornflour	14 ,,
Salt	3oz.
Vanillin	1 ,,

For full details of the plant required and processes used, reference should be made to Scarborough's book.

Pale Chocolate

1,703. *What is the harmless colouring matter used to give certain chocolates the aspect of milk chocolate? If this pale aspect is not obtained by means of a colouring matter, by what process is it obtained?* (Brussels.)

On the face of it, this does not seem to be a very "ethical" aspiration. I cannot quite understand what you are aiming at. One would have thought that the addition of a milk powder or other form of milk would have been the cheapest way of obtaining pale chocolate. I cannot see how you are going to get over the difficulty if you are not going to alter the amount of cocoa ingredient in your chocolate.

Of course, the colour of plain chocolate can be varied to some extent by means of the beans employed in the recipe, and the question of cost enters here, as some of the lighter coloured beans are much more expensive.

The degree of fermentation also influences the shade of the kernel. Caracas has a light brown kernel, sometimes rich brown. Ceylon and Java are light coloured, and for this reason often are included in milk chocolate blends.

Artificial Cream

1,704. *Kindly inform us as to how artificial cream is made.* (Tokyo.)

For the preparation of a reconstituted cream, about equal weights of butter (or margarine) and milk (or milk powder and water) may be used. For example, one may melt 5 lb. 12 oz. of saltless butter in a pan, stir in 2 qt. of fresh milk, raise to about 150° F., and pass through an emulsifying machine after slightly cooling. To obtain maximum whipping properties the cream should be put in cold store for 12 hours.

Chocolate Compound

1,705. *Kindly furnish us with your information on chocolate compound for baking and confectionery.* (Japan.)

If the compound is to be incorporated with the dough to make a chocolate cake the best course to follow is to use cocoa powder to the extent of some 8 to 10 per cent. by weight of the total mixture. It is an improvement to add to the cocoa a very small proportion of cinnamon powder (about ·03 per cent.) and ·01 to ·02 per cent. of vanillin. Baking is then carried out in the usual manner.

To make a chocolate covering for small cakes or gateaux of any description it is difficult to improve upon the straightforward course of dipping into melted chocolate or pouring the latter over the finished confection. If this is done carefully a glossy finish can easily be obtained.

A cheaper method is to prepare a chocolate compound by rubbing powdered chocolate with a small proportion of glycerin till thoroughly mixed, preferably in a mortar. The mixture is then transferred to a vessel and syrup and water added together with vanilla flavouring. A filler of cornflour or potato flour is mixed in and the whole boiled for five minutes, when the covering is ready for immediate use. It is put on before baking and gives a covering of very pleasing appearance. Care must be taken not to spoil the gloss of the coating by adding too much filler, but if this has been done it can be partially repaired by the use of dried egg yolk.

1,706. *We require a recipe for a chocolate syrup for soda fountains, to be mixed with soda water in the proportion of* 1 : 6 *or* 1 : 8. (Palestine.)

Try this:

Grated chocolate	5 lb.
Water	2 gal.
White sugar	25 lb.
Egg powder	2½ oz.
Condensed milk	3 lb.
Essence of vanilla	1 oz.

Milk powder may be used in place of condensed milk. Make the chocolate into a paste with a little of the water. Add the egg powder. Then put the water and sugar in a pan, boil, filter, and put back into the pan, and then add the rest and bring to the boil. If the milk powder is used soak it overnight in 1½ pints of cold water. This should take 6 parts of simple syrup to 1 part of chocolate syrup.

Syrup

1,707. *Can you please give us a good recipe for a "golden syrup"?* (Italy.)

Some particulars were supplied, but it was pointed out that an experienced man is required for this job.

See also reply to No. 1,708 below.

1,708. *In the February issue of your journal under item No.* 1,527 *you refer to golden syrup, and as we are interested in this line we shall be very glad if you will forward us full particulars as furnished to your other correspondents.* (Natal.)

We think your best plan would be to refer to Enquiry 1,557 in the April issue of FOOD MANUFACTURE, as this contains all the information we have on the subject.

Sugar Loaves

1,709. *I am interested in producing, from ordinary granulated sugar, solid loaves of about* 4 *lb. weight in the shape of a cone.*

I should appreciate very much your suggestion for a simple and practical method of obtaining a hard solid loaf of sugar. (Gibraltar.)

Detailed instructions for preparing the loaves and refining the sugar were forwarded to our correspondent. These will be published in a future issue.

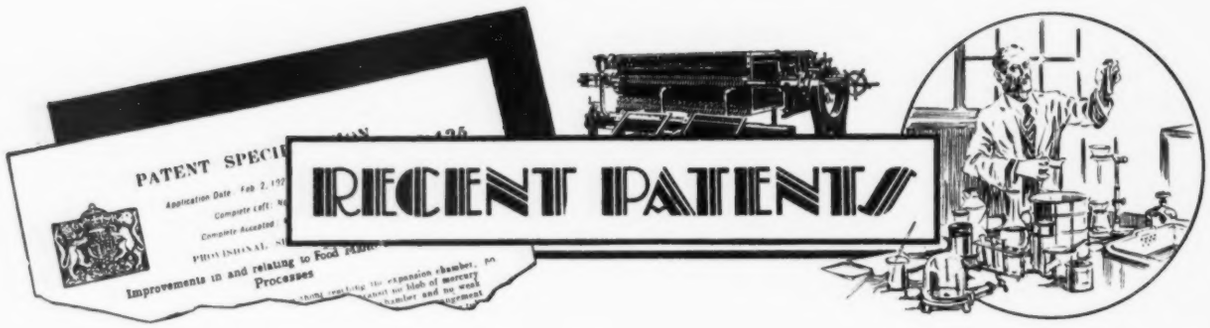
Lactalbumin

1,710. *Page* 231 *of your July issue has an account of work by Professor Watson, of the American Bureau of Dairy Industry, on the separation of Lactalbumin. Kindly state where we can find a copy of this paper.* (New Zealand.)

An account of Professor Watson's investigations on the decrease of salts in whey protein by electrodialysis was published on pp. 640 to 645 of *Industrial and Engineering Chemistry* for June, 1934. The object of this work was the design of an apparatus suitable for quantity production of lactalbumin (whey protein) of an ash content sufficiently low to permit of the use of the purified product in infant foods, and thus to make their lactalbumin content comparable with that of human milk. Such a modification of cow's milk involving the adjustment of casein and lactalbumin to the proper percentages and protective ratio is considered necessary by specialists in infant foods in order to obtain the proper physical characteristics, and hence the digestibility, normal to human milk.

The apparatus devised has been found efficient and practical.

(Owing to exceptional pressure on our space in this Special Canning Issue, Enquiries 1711-1723 are unavoidably held over until December.)



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

24996. Distillers Co. Ltd., and Meyer, E. A.: Making bread, etc. August 30.
25085. Jackson, E.: Apparatus for making coffee, etc. August 31.
25212. Chambers, R. M.: Machines for depositing dough, etc., in measured quantities. September 1.
25236. Böggild and Jacobsen, Böggild, C. B. K., and Jacobsen, M.: Treatment of chocolate, etc., masses. September 1.
25503. Jones, A., and Jones, W. H.: Apparatus for dividing dough. September 5.
25750. Tomkins, R. G.: Preservation of foodstuffs. September 7.
25786. Jahn, A.: Cutters for mincing-machines. September 7.
25813. California Fruit Growers' Exchange: Food preservative means. September 7. (Germany, September 7, 1933.)
26060. Eggert, F., and Helff, E.: Heating contents of food receptacles. September 17.
26118. Hole, C.: Method of cooking food at controlled temperature. September 12.
26625. Lee, J. F.: Chopping or mincing devices, etc. September 17.
26884. Johns, W., and Howman, H. E.: Means for cutting bread, etc. September 19.
27544. Sieber, J. P.: Treatment of cream, etc. September 25. (Switzerland, May 11.)
27884. Rasmussen, A. Gerner-: Preservation of fruits, etc. September 28. (Denmark, October 17, 1933.)
27973. Standard Brands, Inc.: Method of producing milk. September 29. (United States, October 12, 1933.)
27974. Standard Brands, Inc.: Method of producing eggs. September 29. (United States, October 12, 1933.)

Complete Specifications Accepted

415,819. Feremutsch, P.: Conversion of milk and cream into butter. (Addition to 398,666.) (March 10, 1932.)
415,868. Pomosin-Werke Ges.: Preparation of stable fruit juice and fruit syrup suspensions. (June 20, 1932.)
415,977. Lemale, P. C.: Apparatus for concentrating fruit juices.
416,149. Mead, Johnson and Co.: Food product and method of preparing the same.
416,216. Bryden, J.: Apparatus for drying materials, particularly tea and other vegetable products. (December 8, 1932.)
416,483. Dehn, F. B. (California Packing Corporation): Process of treating sugar solutions.
416,618. Strabel, J. F.: Cutting, slicing, or carving appliances.
416,621. Rollmann, H.: Preservation and packing of perishable commodities such as foodstuffs.
416,632. Conservenfabrik Lenzburg vorm. Henckell and Roth, and Schlor, J.: Treatment of fruit juice.
416,777. Chivers and Sons, Ltd., and Rendle, T.: Manufacture of jellies.
416,970. Bassett and Co., Ltd., G., and Bywaters, H. W.: Manufacture of sweetmeats.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.

414,334. **Pressed yeast manufacture.** Ramesohl and Schmidt A.-G., Oelde, Westphalia, Germany. (Convention date, Germany, June 26, 1933.)
A special plant which occupies a small space and can be easily cleaned and sterilised is used for intensive washing of yeast cells with a view to obtaining highly concentrated yeast milk.

415,303. **Cold storage of fish.** Soc. R. Maubaillarcq et Cie, 44, Cours des Dames, La Rochelle (Charente Inférieure), France.
By maintaining freshly caught fish at a temperature of $-2°$ to $-3°$ C. in air-tight and water-tight containers, freshness is maintained for about one month. When the containers are opened after this period the skin is still bright and no loss in weight will have occurred. Haddock, cod, and other non-flat fish should first be gutted through the gills, but the latter are not removed. A suitable container with a capacity of 100 lb. fish is described and illustrated.

415,305. **Fish drying and sterilisation process.** I. W. Smith, The Farrar Boiler Works, Ltd., Newark-on-Trent.
The fish or fish refuse intended for conversion into fish meal is fed upwards on a screw conveyor through an obliquely arranged perforated conduit in a hot water bath. On emerging the material travels through a worm press, which expels residual liquid. The temperature of the water and the rate of travel are adjusted so as to bring about sterilisation without undesirable disintegration or loss of valuable ingredients.

415,656. **Preserving freshness of roasted coffee.** F. Illy, 41, Via Romagnia, Trieste, Italy.
The complete series of operations from roasting to packaging are to be carried out in an inert (*e.g.*, nitrogen) atmosphere. After roasting, the beans are allowed to cool in the inert gas, which is preferably maintained at a pressure slightly above that of the atmosphere and saturated with water vapour. The subsequent operations of grinding, weighing, and packaging in the inert atmosphere are effected with automatic external control.